Food Manufacture

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Dietary Changes.

BRITISHERS DRINK considerably less milk per head than any people in the world. Evidently there is plenty of scope for concerted action on the part of producers in the shape of publicity along modern lines. In this respect we might with advantage turn to the Continent for inspiration. In any case, those who would like to see "Drink more Milk" put into practice are not hard-pressed for advertising copy.

But the most striking thing about English food consumption is the decline of wheat. In 1900 we consumed 351 lbs. per head, and in 1928 only 311 lbs. Civilisation in Europe is held to date from grain-farming (about 2000 B.C.), and if it be true, as some assert, that bread consumption is a measure of culture, one is forced to a rather odd conclusion.

The human consumption of oats and also of meat has dwindled. On the other hand, more fruit and vegetables are being eaten. In Australia and New Zealand, however, the people still continue to eat immense quantities of meat. These changes are affecting the producer, and the future of farming in Britain probably lies more and more with the market gardener—especially when canning comes into its own.

Fish Proteins.

At the College of Medicine, Singapore, Dr. J. L. Rosedale recently gave a lecture on the proteins of fish. The lecturer explained that proteins were, chemically, complexes of amino acids, some twenty of which were known to exist in proteins. The number of amino acids present varied; some of them were absent from certain proteins. Correct tissues could not be built up unless the food contained the required amino acids. Failure of normal growth resulted from restriction, in the diet, to proteins which were not "complete."

Dr. Rosedale instanced the fact that maize was deficient in lysine, which was necessary to build up the normal muscle tissues of chickens. Generally, animal proteins were more "complete" than those derived from seeds. The amino acids of animal tissues had received fairly extensive investigation and this had recently been extended to fish. Several kinds of fish had been studied, both as to the proteins of their muscles and of their roes. Tables were given showing the proportion of nitrogen in various forms present in the muscle and roes of the varieties of fish studied. It was hoped by means of this work to throw some light upon the nature of the peptides. The work was as yet in its infancy, and new methods and modifications of the old ones were now being investigated.

Citrus Concentrates.

Surgeon-Commander J. L. Preston, of the Royal Navy, recently reported that the lime juice now issued to the Navy does not prevent scurvy. As a result of laboratory studies undertaken to find a reliable anti-scorbutic, suitable also from other viewpoints, concentrated orange juice prepared under certain conditions is recommended.

Dried Fruits.

Dr. Myers, of the Australian Imperial Bureau of Entomology, recommends that all Australian fruit should continue to be fumigated on arrival in London until insect-proof packing is adopted, the most promising form of packing yet examined being a paper lining of the present wooden boxes. This conclusion is arrived at by Dr. Myers as the result of an inquiry into insect infestation of dried fruits, a problem which has puzzled the trade for many years. The fruit was carefully followed—entomologically—from the grower to the overseas consumer, in order to find out at what point or points the infestation took place. The curious fact was discovered that fruit shipped in late autumn and winter, although it passes through the tropics, arrives in London in the same state with regard to "grubs" as that stored in Australia until the end of January. He adds that so long as the present cleanli-

ness regulations are enforced, drying rack infestation by "Ploddia" is commercially negligible. The most important finding is that the bulk of the infestation takes place after the fruit is packed.

Starters.

W. Reid, Professor of Dairy Manufactures, University of Missouri, has recently given an easily understandable account of the function of starters in butter making. A starter is a culture of active lactic acid bacteria growing in milk and used primarily to control the fermentation in butter manufacture. In general, they are mixed cultures of the common lactic acid organism (*Streptococcus lacticus*) and types developing volatile flavour and aroma producing acids. The lactic acid, which is non-volatile, produces an acid flavour. The most suitable organisms for association with *Streptococcus lacticus* are *Streptococcus paracitrovorus* and *Streptococcus citrovorus*. The latter acts upon the citric acid of milk and cream, and to a certain extent upon its lactic acid, converting them into volatile flavour and aroma producing acids. So *paracitrovorus* has the same function and develops and uses another product.

A desirable starter is one that will develop a fair proportion of volatile flavour and aroma producing acids without developing an excess of acidity. This means that a proper balance between the organisms has to be maintained.

Discoloration of Halibut.

Harrison and Sadler, of McGill University, Canada, have traced the greenish-yellow discolorations on the bellies of halibut packed in ice in fishing boats to the ice obtained from upland surface waters. *Pseudomonas florescens*, a species of harmless bacteria, frozen in the ice, is transferred to the freshly caught fish and is the cause of the trouble.

Cream Powder.

Mr. Nirop, a Danish butter expert, has invented a process for preparing cream powder by dehydrating milk in such a way that a powder is produced containing 82 to 87 per cent. of butter-fat. When water is added to the powder a cream is made, from which butter may be churned.

The Trafalgar Butter and Cheese Factory Co., Ltd., supported by the Gippsland and Northern Co-operative Co., Ltd., is to install an experimental plant.

Copper and Milk.

Research has shown that the solubility of copper in milk increases with rise in temperature and reaches a maximum at 85° to 90° C. For 30 minutes' contact at 90° C. the loss in weight of the metal was found to be 1·961 mgrm.

Wheat Studies.

The last issue of *Wheat Studies* by Dr. Alonzo E. Taylor, from the Food Research Institute, Stanford University, California, contains the statement that a broad survey indicates that nutritional security in the diet is to be sought in the milk supply, and that wheat (and other cereals) ought to serve us as fuel food. To consume our bread as whole wheat bread instead of white bread would make no essential contribution to the national health, and would not be in the interest of national economy. American agriculture is based on diversified diet, and any step in the direction of vegetarianism is not in the economic interest of the present population as related to land area.

French Dietary.

It is a moot question as to whether food fads and restricted diet are the cause or the result of dyspepsia—both physical and mental. This country vies with America in the multiplicity of food reformers, societies, and so forth. We express this doubt after reading a letter to *The Times* from a resident in France. The correspondent observes, "Nothing in the world save the direst poverty will stop the French working man—artisan or clerk—from consuming his minimum of 2 lb. of bread, of two litres of wine, and at least ½ lb. of animal food a day, with all the supplementary accompaniments of vegetables, cheese, butter, milk, fruits."

It has been stated that France is generally the healthiest country in Europe; the French suffer less from collective epidemics and individual ailments than do many other nations. It has also been said that the men of the French Army were far ahead of all others in powers of endurance and immunity to disease.

The correspondent is convinced that malnutrition is why most English men and women in winter suffer from colds. The French eat and drink with pleasure and they know nothing of the anxiety that gnaws at the minds of those whose less nourishing, less balanced diet keeps them wondering whether they dare risk this dish or that drink—including those who are definitely "food cranks" and those who exercise a greater or less degree of precaution.

But surely there are other considerations to be taken into account, such as "temperament," climate, tradition, rate of energy expenditure. An Englishman is a "cold-blooded" creature; his blood-flow is generally held to be sluggish, and he conserves his energy. Presumably, therefore, he does not require to replenish to anything like the same extent as the more exuberant Frenchman. But one might ask: "What about our Glasgow friends? There is no waste of anything in Glasgow." Certainly, we have often been surprised at the hearty appetites

of the Glasgow folk, but we have always assumed it could be attributed to the climate—and possibly to another reason which we do not care to mention. In any case, a little consideration of these and many other examples familiar to most people is sufficient to show that the correspondent to *The Times* has failed in his diagnosis by neglecting to take stock of all the factors concerned.

Jam Problems.

Some of the main problems in the jam industry requiring solution have been stated by C. P. Lathrop, of the National Preservers Association, U.S.A., to be as follows.

Creation by plant breeding and commercial production of fruits more perfectly supplied with the chemical characteristics found most important for the production of uniformly attractive, pleasing, and serviceable preserves and jellies.

A more complete knowledge of the essential chemical substances, and their variations, with the causes and possible remedy for such variations.

Prevention economically of the oxidation changes in fruits and juices during storage and during manufacture.

A thorough study of the vitamin content of fruits and the effect of different preserving treatments upon them.

Bottled Chocolate.

F. M. Boyles, of Brooklyn, N.Y., states that the latest development in the beverage industry is bottled milk chocolate. Enterprising bottlers, in casting about for new items with which to increase their business, particularly during the off-season, fell upon the domesticated cup of cocoa and bottled it. The pioneers were brought face to face with chemical and bacteriological problems, but they were solved by scientific investigation.

Milk chocolate beverages are very susceptible to bacteria. After experimenting with chemical preservatives without success and suffering heavy losses, the industry found that complete sterilisation after bottling with steam at 15 pounds is the only way of preserving the beverage.

It is this sterilisation process which is giving the average bottler so much trouble. The milk sometimes curdles, owing to small quantities of acid normally occurring in the various ingredients and becoming very active at the sterilising temperature of 240° F.

Mr. Boyles experimented and ultimately found that there existed in the raw material small amounts of acid which varied from time to time and must be exactly neutralised to prevent curdling and off-colour. The best indication of acidity is, of course, the hydrogen-ion concentration. Accordingly he made a study of the pH of the various ingredients dissolved or suspended in water in about the same concentration as in the finished beverage. The pH of numerous curdled specimens was also determined. The lowest pH so found, 4·6, afforded a temporary maximum acidity limit which could be tolerated. The following acidity limits of available materials resulted in satisfactory batches:

Material	*Acidity Limit*	
	Max. pH.	*Min. pH.*
Skim milk powder ...	6·25	6·85
Cocoa	6·20	6·25
Corn syrup	3·2	4·44
Commercial cane syrups	3·2	6·8
Water	6·8	8·6
Honey	3·5	4·2

The effect of free acid on the milk content of the beverage was also determined. Also, he showed that a common cause of curdling is carbon-dioxide, which leaked past a closed valve.

Tomato Waste.

A question that has occupied the attention of Campden recently is profitable utilisation of low grade tomatoes. Thus, the annual production of glasshouse tomatoes in the Lea Valley is about 40,000 tons; of this about 1,500 tons of "chats" (small fruit) and "splits" (split or badly shaped fruit) are marketed at unremunerative prices. From this low grade fruit, Appleyard and Hirst have prepared canned tomatoes, tomato chutney, and tomato sauce of excellent quality which found a ready sale.

The "chats" were in good condition, but the "splits" were badly moulded. In this connection it is interesting to recall the views held by R. O. Brooks, who was concerned with food inspection work for nearly thirty years, that it does not follow that all mould indicates rot (decomposition), that excessive mould growth, causing appreciable rot, is detectable by chemical methods, and that unless chemical data confirm the microscopic "counts," tomato products should not be destroyed off-hand in wholesale quantities. Brooks refers to the fact that mould rot rapidly diminishes the citric acid content and that bacterial spoilage is accompanied by the formation of lactic acid in excessive quantity and the formation of volatile acids and free ammonia.

Fruit Minerals.

It is probable that the mineral content of apples is a factor of some importance in relation to keeping properites, and it is suggested that bad keeping properties of apples from young trees may be due to an intake of water in excess of that of salts.

Cranberries from South-Eastern Massachusetts have been shown to possess a relatively high content of iodine. Has the iodine content of British cranberries ever been determined?

Reconstituted Cream.

In the course of a recent address, Mr. C. H. Manby, the City Analyst of Leeds, referred to the claim that the life of reconstituted cream, which was prepared by the emulsification of water, saltless butter, and separated dried milk, was longer than that of natural cream. Reconstituted cream, in appearance, taste, and chemical composition, closely resembled the natural product and might be regarded, in some cases, as superior. Tests to differentiate between the two creams were very difficult to devise, owing to the rapidity with which the properties of both varied on keeping.

In the ensuing discussion, Mr. J. Firth thought that the introduction of reconstituted cream offered good opportunities for the deception of the consumer, as a natural cream containing 56 per cent. of fat might be quite liquid compared with a reconstituted cream containing only 20 per cent.; and in the latter case the quality of the fats present might not be so high.

Polar Pickles.

Pickles are to play a prominent part in the exploration of the Antarctic. Sir Douglas Mawson will take with him a large and varied stock on his visit to the South Polar regions this year. We can well imagine that an unvaried diet of seals and penguins for two years or so would tend to become a trifle monotonous without something to enliven it. The famous explorer is stated to have given a little information which surprised even the food makers. This was to the effect that seal flesh contains five times more vitamins than any other kind of flesh in the world. The seal in the Antarctic lives for six months in darkness, and it has to store up energy to live during that time. It appears that seal flesh is a very nourishing food.

Chewing Gum.

Now we know why chewing gum is so popular! A recent patent lets one into the secret. According to this, a gummy product is prepared by reaction between an aliphatic vinyl ester and a saturated aliphatic aldehyde; sugar flavouring ingredients, or gum chicle, *may* be added. We should imagine, however, that the "aliphatics" would be quite sufficient for the ordinary person.

Bacteria in Milk.

Under certain conditions milk may contain more living bacteria after pasteurisation than before, owing to the introduction into the raw milk of both heat-resistant and heat-loving bacteria. This conclusion is stated by R. S. Breed in Bulletin No. 559, issued by the New York State Agriculture Experimental Station. The heat-resistant bacteria survive pasteurisation temperatures and tend to grow well at 38° to 45°: they are probably derived from insufficiently sterilised dairy utensils. The heat-loving bacteria actually multiply rapidly at pasteurisation temperatures: they are derived from the dust, hay, silage, etc., in proximity with the milk, and their development is favoured by faulty procedures during pasteurisation, such as holding the milk at pasteurisation temperature for longer than 30 minutes, re-pasteurisation of left-over milk, and the incomplete removal of one batch of milk before introduction of the next. There is no evidence to show that the presence of these bacteria in milk is dangerous to human health, but in excess they cause a noticeable change in the acidity of the milk and also disagreeable flavours.

Fish Research.

In a written answer to Sir A. Sinclair, Mr. Guinness has stated that, with assistance from the Empire Marketing Fund, the Department of Scientific and Industrial Research had secured the lease of a site at Aberdeen suitable for a fish research station. Two buildings already in existence on the site were being adapted for use as laboratories for research on the preservation of fish and of fish by-products until experience had shown the requirements of a permanent building. Plans for the necessary cold store and other adjuncts were being made with due regard to later developments.

Politics.

Nowadays the sprinkling of women in professional politics stands for something more than "Vamping Venus." Sometimes it stands for hard, practical common sense and cold, biting logic. These professional talkers (male), once they get into their stride, are apt to lose themselves in a cloud of words—as, for instance, in the recent controversy in Parliament over the milk publicity campaign. But they were brought down to earth by a simple question from Viscountess Astor: "Does the right hon. gentleman not think that, if the Minister of Agriculture had advertised milk as assiduously as *he* has stout, *it* would be more drunk?" We wonder! It also shows the great care that must be exercised by the Press in reporting the spoken word; slander and thousands of pounds might easily hinge on a tiny word of two letters.

Pure and Applied Science.

The article on "Pure and Applied Science," which appeared in the March issue of FOOD MANUFACTURE, was erroneously ascribed to B. Callow. The author of this article was Dr. E. H. Callow, who is well known for his scientific researches in the low temperature Research Station at Cambridge University, where he has been working on fruits and other foodstuffs for some time.

The Microscopy and Chemistry of Milk

By JAMES SCOTT, F.R.S.A.

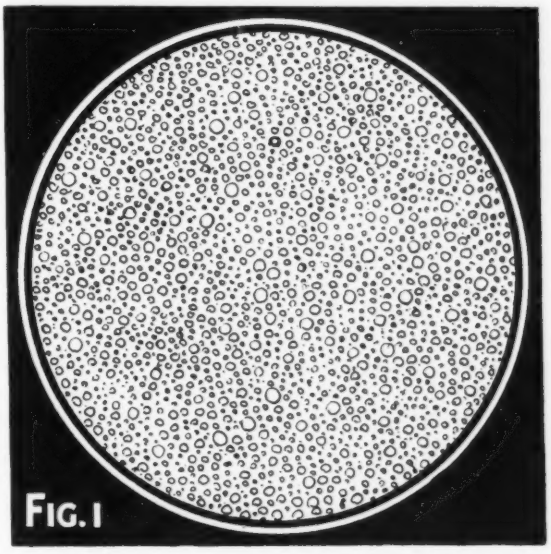
A general survey, by the author of "The Microscope in the Mill," etc., of an intensely interesting subject.

PART I

Milk as Food.

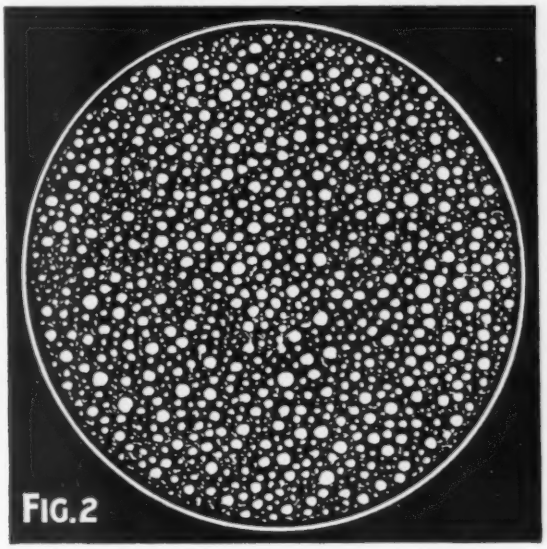
ALTHOUGH COW'S milk has for past generations been regarded as a *drink*, it has now been concluded, by the highest scientific authorities, that it should be classed as a *food*. Hence the widespread injunction to "*Eat more milk.*" Essentially, it is *a solid* in solution, and when its water is evaporated from it a "condensed" residue is left.

Seeing, also, that milk enters so largely into the composition of cakes, biscuits, confectionery, and many other forms of edible substances, its consideration becomes a matter of importance to everybody concerned in its collection, distribution, use, and consumption; yet, not many months ago, when I proposed to the editor of a widely read, well-produced monthly journal representing the milk industry that I would be willing to prepare some illustrated articles on this subject for publication in his periodical, he replied that his readers, and most dairymen, did not want to learn anything about the composition, chemical changes, and bacteria of milk, but *desired solely to be told how to increase their sales of it!*



One Twenty-fourth Inch View of a Thin Layer of Fresh Milk showing its Fat Globules which by Rising and Fusing form Cream.

A light is shining through them.



One Twenty-fourth Inch View of Fat Globules Illuminated from above only.

These coalesce to form cream and butter.

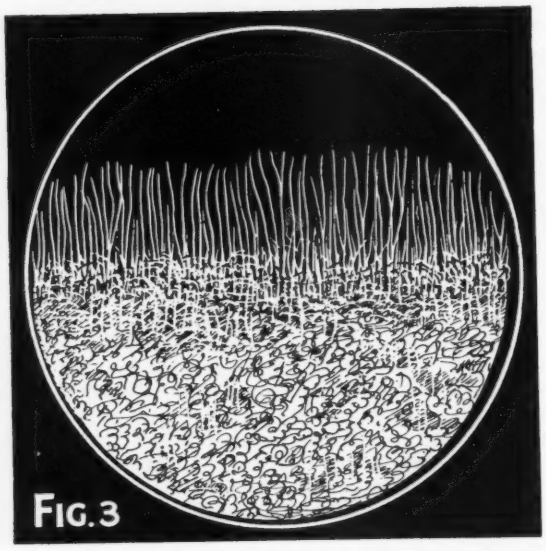
The War against Prejudice.

That there are people, however, who do want to know something concerning this remarkable food there can be no doubt. The public are safeguarded as far as is possible against procuring unsavoury milk by public analysts, in spite of the prejudices, fostered by ignorance, which exist. Movements are afloat, too, in various parts of the country to found bodies of experts who shall enlighten farmers, dairymaids and men, milk-roundsmen, shopkeepers, and consumers—good signs of our rapidly advancing times; and such ideas deserve practical encouragement, as they can only benefit an industry which means so much to the country.

I do not propose to—nor, indeed, *could* I—cover the whole ground of the technicalities of milk, but I will bear on the main features of the subject. Undoubtedly milk is the richest, most nutritious food known to man, and thus is more liable to spoliation by bacterial and chemical influences than are less notable substances, as it is well known that the better foods happen to be the more susceptible they are to destruction or decomposition by germs. Hence the necessity for scrupulously supervising the various phases of our milk supply and application.

The Risk of Infection.

When milk is freshly drawn from the cow, provided the animal is in a clean, healthy condition, and the whole of the surroundings and utensils are thoroughly



One Twenty-fourth Inch View of *Ovidium lactis* Mildew (White) Growing on the Surface of the Souring Milk, for the Acidity of which it is partly responsible.

Shown on a larger scale in Fig. 5.

hygienic, it contains only a few bacteria. But there are so many possibilities of infection occurring in fields, sheds, and dairies that it is rather rare to find an absolutely pure grade raw or fresh milk; although it should be noted that this term does not signify that milk is, as a rule, contaminated—it simply means that we cannot expect milk to be entirely free from such tiny, ordinarily invisible forms until it has been systematically and scientifically treated. These organisms will be dealt with later on.

The Colour of Milk.

I will begin the illustrations with the results of making a microscopical examination of milk. Anybody looking at a glassful of milk might excusably believe that it was opaque, yellowish, or creamy in colour, even when it was magnified. That is not the case, however, for if we spread a drop of the fluid over a glass slide, it will appear, when viewed through the microscope, as a water-white, *transparent* film, in which are myriads of tiny, transparent, colourless globules of the kind shown in Fig. 1.

By cutting off the light which passes up from beneath the milk and allowing an upper one to fall on it, the globules become brilliantly illuminated, as shown in Fig. 2, but there is not, meantime, a trace of yellow nor any other shade.

The Formation of Cream.

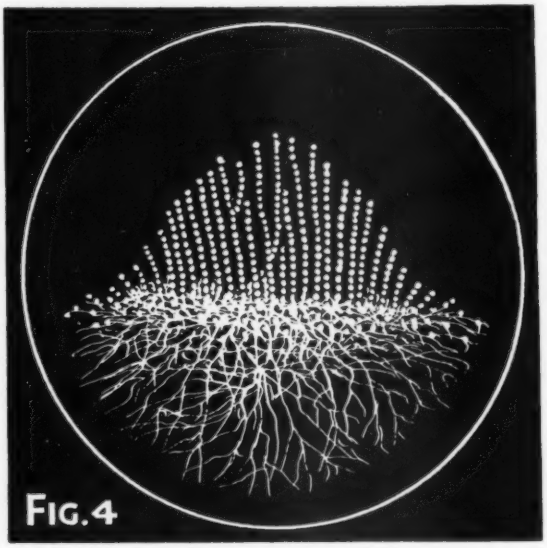
It is really these tiny globules, however, which (collectively) impart the familiar hue to milk in the mass, and comprise the ultimate cream. In new milk they are distributed throughout the fluid in every direction. When, however, the milk is allowed to stand undisturbed for a few hours they rise gradually, stick together, and constitute the *cream*, leaving only a comparative few of their companions behind when the milk is skimmed.

Notwithstanding their extreme minuteness, these *oily* globules—the basis of butter—are each enclosed in a delicate membrane, capable of being stained. The material of these *casings* help very largely to form the *casein*, or curdy principle, of specially treated milk, when a dry, proteid, fine powder, known by the name stated, results as a separate constituent. But the various components of milk are so strangely embodied therein as ultra-microscopic particles, molecules, and so forth, that it is not advisable to be dogmatic on this point.

A Remarkable Micro-Fungus.

At this stage I think that it might be advisable to deal with a micro-fungus which appears to be symbiotic, as it were, to milk. If pure milk is kept still for a few hours, and the skimmed substance is referred to, its surface is seen to become faintly fluffy. It is difficult to observe this change, unless one uses a reading lens. The top has a kind of minutely floury condition.

This modification is due to the rapid growth in the milk of the micro-fungus known as *Ovidium lactis*. Its general appearance, viewed sideways, is shown in Fig. 3, while a tuft of it, magnified on a still larger scale, is shown in Fig. 4. The branching filaments are *in* the milk; the necklaced beads are *above* it, in the air. The first-named are hollow, and contain ferments, or enzymes, which operate *favourably* on the milk. They have been derived from spores sprouted when fallen into the fluid, or else already present in it. *It is impossible to trace their precise origin.* The second-named are upright rows of spores, grown from the submerged filaments, or *mycelia*, and impart the fluffy texture to the surface of souring milk. They separate, and continue the growth of the plant.



A Tuft of *Ovidium lactis* Fungus detached from the Surface of Sour Milk; Magnified more highly than in Fig. 3.

Each bead is a reproductive seed-like spore.

Lactic Acid Bacilli.

These micro-fungi work in conjunction with the *Bacillus lactis acidi*. They convert the lactose, or milk-sugar, into lactic acid, which, when present in moderate quantities, is beneficial dietetically, and is the cause of the *desirable* souring of milk, such as is sought in the preparation of curds for the making of soft cheeses.

It is important to note, however, that the "souring" of milk is also liable to be produced *undesirably*. Unless the milk is very clean and allowed to sour in the most hygienic places possible, with suitable ventilation, it will become subject to butyric fermentation simultaneously or subsequently.

Obnoxious germs which apparently thrive on milk, butter, and cheese strive (so to speak) to oust the rightful lactic varieties, and they soon convert the lactic acid into butyric acid, which is one of the most abominably smelling liquids known. Lactic acid, on the other hand, has no odour.

It is quite an easy matter to watch the gradual formation of lactic acid. Place two or four glass test-tubes—one only in each case is enough—containing samples of the same milk, as fresh as possible in condition, in different places; one (or a pair) in a clean atmosphere; the other (or others) in an impure atmosphere, such as that of a stable or work-shed. Plug the orifices with cotton-wool.

Experiments with Lactic Acid.

Eventually the elements of the milk will separate from one another—the creamy portions rising to the top, and the curdy ones sinking to the bottom. Meantime, at their junctions will appear a faint, clear line, indicative of separating lactic acid. You may watch this area widening hour by hour, until it occupies, say, a fifth or sixth of the tube as a space *transparent to light*. Hold the hitherto opaque column of milk up to a window, and it will be possible to see as plainly through it as if the fluid consisted of water.

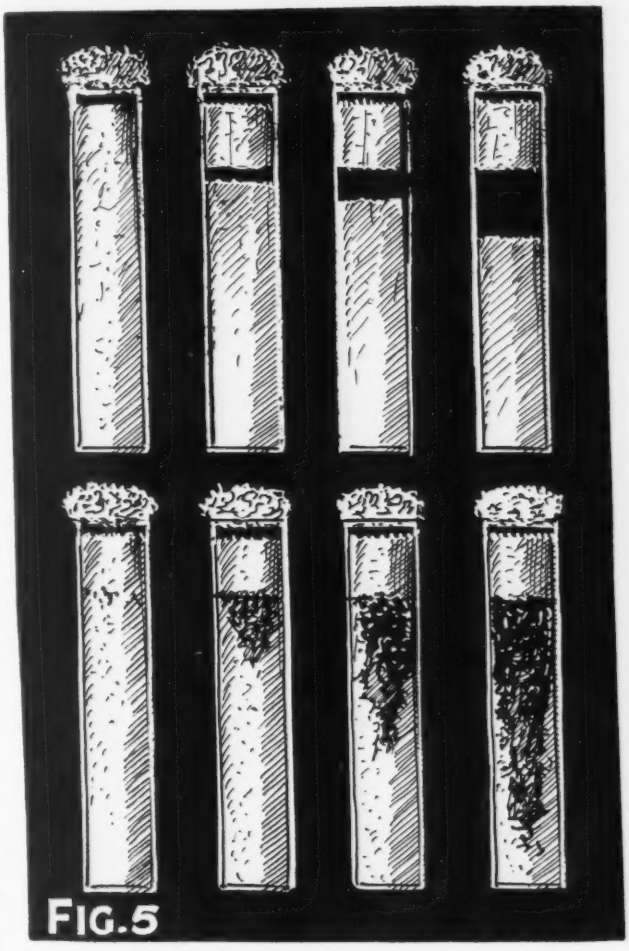
If the other tube (or pair of tubes) has been watched, it will be found that instead of the contents dividing neatly and yielding a transparent space in the upper regions, the lower, or curdy, portions will split up irregularly, as butyric bacteria feed on the elements, forming acid-gas pockets which burst and unite so nastily that, finally, deep fissures, cavities, and odd spaces occur.

Similar results will follow if the properly lactic-acidified column is kept for several days, when, on account of the production of lactic-acid ceasing, butyric germs commence to operate (see Fig. 5).

It is noteworthy that all the lactose, or milk-sugar, can be turned to lactic acid if the latter is drawn off at intervals. If the first-formed quantity is left in the milk it inhibits further action of its own bacteria, or bacilli, and thus allows the butyric enemy germs a chance to multiply.

The Albuminoids.

The composition of milk is very intricate in character. The albuminoids alone might take up hours of one's time. These items are, collectively, of a nature kindred to the albumen, or "white," of eggs, but have their individual and distinct inherent elements. Other names for them are proteids, proteins, and colloids; although it must be noted that other substances, even inorganic and mineral, can be colloidal, or jelly-like—*e.g.*, silver, copper, and clay.



Two Series of Tubes beginning with Fresh Milk Contents.

The upper set shows normal, the lower abnormal, modifications. In the lower set are seen moulds, etc., which putrefy the milk.

Casein and Nuclein.

Casein and nuclein are two of the more prominent albuminoids. Casein *resembles* alkali-albumen, or a compound analogous with albumen and soda or potash. A solution of *prepared* alkali-albuminate, after being shaken up with water, behaves just like casein. There is no space in which to deal with problematical phases of the test unfortunately; this is a matter for the attention of expert food analysts. A solution of soda-carbonate, added to milk, precipitates the casein and its kindred compounds.

(*To be continued.*)

A SUMMARY

By E. W. LEWIS, M.A., Ph.D.

THE PROBLEM of finding a more efficient and at times a cheaper material than tinplate for the manufacture of containers for the canning of edible products has attracted considerable attention during recent years. The violent fluctuations and continued high price of the tin metal, together with the persistent efforts of the respective manufacturers in order to find new outlets for stainless steel and aluminium products, have to a very large extent been responsible for the search for a substitute. Amongst the materials which have been proposed from time to time are: lacquered steel, stainless steel, aluminium, and aluminium-surfaced steel; in the latter case a thin sheet of aluminium is rolled on to the surface of the steel plate, or the aluminium is deposited electrolytically on to the steel surface. The packing of foods in lacquered containers has been the subject of experiment in Italy for the last five years. Up to the present no definite conclusions have been arrived at; the difficulty appears to be that if the packed product is exposed to a sudden change of temperature the unequal expansion of the dried lacquer and that of the steel surface tends to loosen the lacquer away from the metallic surface and finally fall away. Nitro-cellulose lacquers are now being experimented with and are giving highly promising results.

Stainless Steel.

The study of the possible application of stainless steel in the canning industry is of comparatively recent origin. Stainless steel containers are highly commended by all the authorities who have studied the question, there being considerably less corrosion than there is in the case of tinplate. From a commercial standpoint, however, it is doubtful whether stainless steel will compete for many years with tinplate, due to the much higher price and dull greyish appearance compared with the bright, lustrous appearance of the tinplate. Regarding the use of aluminium, there is a possibility of its becoming a formidable competitor to tinplate in the manufacture of high-class containers. The outstanding difficulty in the use of aluminium is the soldering; however, an intensive research is now being conducted by some of the large metallurgical interests in this country, and it is anticipated that a solution of the aluminium difficulty is imminent.

Recent Work in Germany.

Aluminium is again at a disadvantage in being at present considerably higher in price than tinplate. However, it is claimed in a recent German patent that aluminium-plated steel can be produced in Germany at a lower price than tinplate, due to the lower price of aluminium—namely, £95 per ton—compared with tin metal at £230 per ton. A German firm has recently advertised that it is about to market a steel plate, electrolytically plated with aluminium, at a price 20 per cent. lower than the current prices of tinplates. This process appears to be more promising than the previous proposal, which was to roll the thin aluminium sheet on to the steel. The uses to which such metal compositions as aluminium-sheeted steel can be put would be limited to those which did not involve excessive bending or any other form of severe deformation. There is also the problem of the action of food juices on aluminium and aluminium-surfaced containers, this being somewhat higher in the case of nickel and aluminium than in the case of tinplated vessels. Jarvinen (*Zeit. Unters. Nahr. Genussm.*, 1923, vol. 45, pp. 190-191) has studied the problem, with the following results, the figures given being the milligrams of metal dissolved per one kilogram of solution:

	Currant Extract containing	
	40 per cent. Sugar and 1·2 per cent. Citric Acid.	*5 per cent. Salt Solution.*
Tinplate	27	7
Nickel	76	4
Aluminium ...	120	9
Brass	0·5	1·2

A large number of processes and materials have been patented in respect of replacing tinplate in the food canning industry, and numerous practical trials have been carried out by the American food canners. Up to the present, with the exception of aluminium, the present price of which is prohibitive, no suitable material has been found which would compare in price from a commercial standpoint and combine the suitability and adaptability of the tinplate. In the event of the availability of a cheap source and supply of aluminium and a solution of the technical and practical difficulties of the soldering and welding of aluminium containers, this material will certainly enter the field as a serious competitor and rival to tinplate.

THE CHOIC
IS TINPLAT

STAINLESS STEEL, ALUMINIUM, AND LACQUERED CANS

BY E. J. NORTON

BROADLY speaking, three substitutes have been suggested at various times for the ordinary tinplate used in canning. Dr. Kohman, of Washington Laboratory, after experimenting with lacquers, considered that for certain products they might be developed to make tin unnecessary. Secondly, aluminium has often been advocated for cans, and numerous experiments have been conducted, especially in Germany. Dr. H. Serger, of Brunswick Research Institute, found that aluminium was attacked less than tin of the usual tinplate, and that dissolved

OF METALS SUPREME ?

aluminium in contents produced no toxic effect. Thirdly, the possibilities of stainless steel cans have been considered and a certain amount of experimental work carried out.

The results hitherto may be summarised as follows: (1) Lacquers will answer with certain products only; (2) there is likely to be more prejudice against aluminium than exists against tinplate, the higher price renders its chances indifferent; (3) stainless steel has hitherto been difficult material from which to mould the cans, whilst cost is higher than tinplate and considerable experiments would have to be carried out over an extended period. Of the three, however, stainless steel seems to offer the greatest possibilities and acid-resisting qualities.

Aluminium in U.S.A.

Respecting aluminium, there has been much outcry in the United States against cooking utensils and cans made from this material, although much of the prejudice appears to be based on weak evidence which has often been proved fallacious. In both cooking and canning, the metal is not attacked sufficiently to cause injury to the consumer—many foods contain more aluminium than is given off by the can or utensil after prolonged boiling. Ripe apples, according to Langw· rthy and Austin's textbook, contain 0·108 gramme; peas, 0·016; ripe cherries, 0·272, and eggs the relatively high quantity of 1·56 gramme aluminium per pound. The United States Public Health Service, the *Lancet*, and a large number of authorities on both sides of the Atlantic have investigated the question and shown the prejudices to be mistaken; but the general opinion seems to be that in the canning industry aluminium is not likely to be adopted widely.

A Question of Price.

Stainless steel stands in another category. As produced to-day in Sheffield, it is much dearer than tinplate. If violent acids are to be resisted the proportions of chromium and nickel put into the iron have to be high, rendering the metal harder and less applicable to can moulding. There is another point which may be detrimental to the use of stainless steel —viz., the cans would be grey when finished in contrast to the bright cans made from ordinary tinplate.

The two chief stainless steels produced in Sheffield are 2s. per lb. (containing approximately 18 per cent. of chromium and nickel) and 1s. 3d. to 1s. 6d. per lb. (containing about 12 to 14 per cent.). The former

(*Continued on next page.*)

STAINLESS STEEL AND NICKEL UTENSILS IN THE MANUFACTURE OF PICKLES AND SAUCES

By H. G. Ashton

When speaking of pickles we generally refer to three principal vegetables—onions, gherkins, cauliflower, and either malt or acetic acid vinegar. In England these three vegetables are most extensively used, although the pickle manufacturer in a few instances now packs red cabbage and beetroots.

In the sweet pickle, which is very popular in America, and is also becoming more generally known and appreciated in England, we get in addition to the onions, cauliflower, and gherkins, chutney, tamarinds, tomatoes, beans, and many other varieties.

The manufacture of pickles has for many years been carried on in a very crude manner. Little attention has been paid to clean, sanitary, and suitable utensils.

To-day, however, many manufacturers are looking for better and more suitable vessels and containers in which to manufacture and store the pickles. Further, owing to the various Food Regulations and Restrictions governing the use of preservatives, the manufacturer is being compelled to adopt new methods and measures.

While much has been done to make the pickles purer and more fit for human consumption, we are a long way from perfection in the nature and purity of metal used for utensils for the manufacturing processes.

The very nature of the vegetables and vinegar is an acid that causes corrosion of certain metals which is injurious to the human system, and sooner or later, the use of such metals will probably be prohibited by regulations.

Former Practice.

Up to recent times the manufacturer has been confined to the use of wood, copper, or enamelled iron utensils, and long experience in the trade has proved all of these to be far from satisfactory.

Vessels made from wood, after being in use for some time, no matter how careful one may be in washing and cleaning them, become coated with a slimy substance, and in hot weather it is a positive menace owing to the many small flies that so rapidly breed under these conditions. There is also the ever present danger of the small flies finding their way into the finished product, to the disgust of the consumer.

Even where the greatest care and attention are paid to clean, hygienic conditions, the yeast spores are present in the air. These will readily settle on the wood utensils and where they receive every encouragement to germinate.

It is now generally accepted that these spores set up fermentation in pickles and sauces, which in itself is a very serious matter for the pickle manufacturer. Therefore, the use of any metal that will counteract the activities of these spores will be a boon to all the manufacturers.

With copper utensils we find that in a very short time the acids set up verdigris, and even after long

and careful scouring, it is very doubtful if this poisonous substance is completely removed.

In the case of enamelled iron, the vessels receive severe knocks during use in the many processes in which they are used, with the result that enamel chips and fragments have been found in the containers when packed; but what of the fragments that are so small that they cannot be detected by the operator and which may have a serious effect upon those unfortunate enough to eat the enamel with the pickles?

In the past, manufacturers have been compelled to use these utensils owing to the inability of machine makers to find an alternative suitable metal, but pickle manufacturers to-day have no possible excuse to offer in continuing to use these. There is now stainless steel or nickel sheet that will stand all the effect of the knocks in the wear and tear of the factory, will last longer than either wood, copper, or enamel, and after long and careful experiments in the actual manufacture of pickles has been proved to withstand hard wear, and, more important still, to be acid resisting.

From the manufacturer's point of view, these metals are the most economical of all, and give most satisfaction in every possible way. Utensils made from them are easy to clean, and so help to reduce labour costs.

The Advantages.

From the consumer's point of view, which, after all, is the main consideration, there is the guarantee that the product is perfectly pure, clean, and wholesome, that it is free from any slimy substance due to wood, and from yeast germs or spores; also, there is no fear of verdigris caused by using copper, or any danger of enamel chippings contaminating the pickles. The consumer would be assured of a pure food.

How do these utensils—wood, copper, and enamel—affect the manufacture of pickles, and in what way can they cause the vegetables to become contaminated? The vegetables are first stored in a solution of brine until they are required for packing into glass containers. The vegetables are sorted and graded, then packed; after packing they are allowed to drain on the tables and the brine solution is all drained away. After sufficient time has been allowed for draining, the vinegar is added to the vegetables. Here very often enamel vessels are used to pour the vinegar into the glass container; often these are pitted with small acid holes or the enamel is broken with the hard knocks that are inevitable in a factory. If copper filling cans are used there is difficulty in keeping the cans clean and free from verdigris.

Nickle and stainless steel sheets can be made into sorting, grading, and packing tables, which can be easily and effectively washed with a minimum of labour; they can be made into filling pots or cans, draining tanks for vegetables, also into 28-gallon, 40-gallon, or 80-gallon steam-jacketed pans for boiling vinegar, spice for Picca liquor, or for boiling sauce, and so forth. These pans have been proved to withstand the action of the acid.

Another advantage possessed by these metals is that they are much thinner than enamelled iron, which is composed of a thick cast iron covered with a non-conducting coat of enamel. The result is that vessels made from nickel and stainless steel permit quicker boiling and use less steam, and therefore less fuel than those made from enamelled iron.

The writer is of opinion, then, that the pickle manufacturer using plant made of nickel or stainless steel can readily turn out products that will pass the most stringent tests for purity and freedom from contamination.

Stainless Steel, Aluminium and Lacquered Cans

(*Continued from previous page.*)

is the only one withstanding the powerful acids used in medical utensils. It resists such acids as nitric acid and solutions of ammonium sulphate, copper sulphate, mercuric chloride, picric acid, etc. It resists alkalis, salts, etc., absolutely. Fruit juices, of course, are easily resisted by all these metals. Recent experiments, too, indicate that a stainless steel could be made at about 11d. per lb. which would be impervious to all fruit juices, and would be cheaper still in mass production. It can be rolled to 30 gauge, and much thinner if necessary, and worked in the same machines in which cans are now made from tinplate—a very malleable and ductile product. The effect of vegetable juices would have to be tested, but the indications are that with canned spinach, peas, etc., there would be no attack on the steel. Such cans would be rustless and impervious to vinegar.

The real commercial opening for stainless steel cans seems to be in the larger packings at present —7 lb. cans and upwards—for use in hotels, ships, canteens, etc. The extra cost of the can would also not enter so much into considerations when canning for special tropical markets. There would be a slight addition as well to cost of soft soldering the stainless cans owing to the requisite cleaning of the steel. A process has been fully demonstrated, too, for polishing stainless to resemble electro-plate, but that would inflate costs too much. The proved acid-resisting properties of stainless steel, however, show the metal to be excellent for canning, and it may be that in time this material will compete seriously with tinplate.

The Utilisation of Oils and Fats

(*Continued from page* 132.)

to thirty tons, can be treated. The adsorbents are admitted and the whole mass agitated by means of propeller-like blades or banes at a temperature of about 100° C. It is preferable to conduct the operation under reduced pressure.

The oil is examined at set periods, and the depth of colour ascertained by using the Lovibond tintimeter; when the desired paleness is reached then the operation is concluded. The oil is filtered at this stage when it is ready for deodorisation.

Other important methods are air-blowing, hydrogen peroxide bleaching, etc., but these have a limited application for edible vegetable oils generally; the latter method is, however, distinctly useful for fish oils.

The Utilisation of Oils and Fats in the Foodstuff Industry

By PAUL IGNATIUS SMITH

We publish below the first part of a comprehensive series of articles dealing with the properties and utilisation of oils and fats which are used in the foodstuff industry. The methods used in refining operations are first outlined, and this is followed by a discussion of the parts played by vitamins in the dietetics of oils and fats. The subsequent parts are devoted to the oils and fats used in the margarine industry, the manufacture of margarine, cacao butter, the cacao bean, and the expression of the butter and its utilisation in chocolate manufacture, and olive and other oils.

PART I

OILS AND fats play an essential and important part in dietetics.

It would be impossible to state at what period in the world's history they were first utilised as foods, but it must necessarily have been at an early date, especially in cold latitudes.

To the student of industrial evolution, the growth of the oils and fats industry has been achieved by a succession of leaps and bounds confined to the last fifty years. The refining of oleaginous materials has become a complicated scientific procedure. Manufacturers are no longer satisfied with crudely prepared oils, but demand a product almost odourless, in the case of vegetable oils, and free from objectional flavouring characteristics.

The discovery of Sabatier and Senderens in the nineteenth century, that oils could be hardened, deodorised, and rendered tasteless by continued hydrogenation in presence of finely divided metals, such as microscopic particles of nickel, has been applied almost universally to the oils and fats industry; in fact, it may be said to have completely revolutionised it.

Bio-chemistry, that maligned scientific hybrid, and medical science have demonstrated the fact that the dietetic value of a food does not rely so much on its potential calorific assessment, as its vitaminic activity. This is one of the chief reasons why oils and fats are invaluable as foods, because of the fat soluble vitamins or advitants which they contain.

I.—REFINING OF OILS AND FATS

General Methods.

The refining of edible oils and fats is now a most important industry. In dealing with large quantities of crude oil the refiner has to bear in mind that the resultant product must be odourless, tasteless, and neutral; the vitaminic activity of the oils must be unimpaired, and the fatty oils free from all injurious chemicals.

The standard specified above is necessarily high, but needless to say it is seldom attained—new methods, however, based on the latest discoveries and inventions of chemists and chemical engineers are fast supplanting the old rule of thumb processes, with the result that a purer and more edible product is now being obtained.

Crude oil contains a variable amount of extraneous substances, such as mucilage, animal or vegetable tissue, albuminous matter (in solution and suspension), moisture, etc. The bulk of these can be removed by preliminary clarification, settling, centrifuging, and other mechanical operations. Although the removal of coarse suspensions, etc., is important, the present writer does not propose to go into any details, but to pass on to the more essential processes of neutralisation of free fatty acids, removal of products of saponification, decolorisation, and deodorisation.

Neutralisation of Free Fatty Acids.

The percentage of free fatty acids in animal and vegetable fatty oils varies enormously, and depends upon many factors, such as origin and age of the oil. Thus Emmerling (*Landw. Versuchs. Stationer*, 1898, 5) found that palm kernel oil contained an appreciable increase of free fatty acids after keeping for two years. His results are as follows:

Free Fatty Acids calculated as Oleic Acid.

Sample No.	*Fresh Oil.*	*After 2 Years.*
1	7·39	9·25
2	6·38	8·59
3	7·54	8·74
4	9·80	11·86

The above is typical of many kinds of vegetable oils.

As regards origin, it is really surprising to find large variations in the free fatty acid values of such oils as coconut, olive, and liver oil. The F.F.A. value of a sample of commercial olive oil from Syria as analysed by Ballantyne was 23·98, while an Italian variety was no higher than 2·79.

The chemistry of the free fatty acids is exceedingly complex, and in a short article it is impossible to digress; for the present purpose it is sufficient to state that a certain proportion of the acids is volatile. Lewkowitsch gives the following figures, which are illustrative:

Kind of Fat.	*Total Volatile Fatty Acids per Gram : in terms of Mgrms. K.O.H. Distillation Process.*
Fresh cod-liver oil	3·60
Palm nut oil containing 6·68 per cent. free fatty acids ...	19·55
Coconut oil containing 9·9 per cent. free fatty acids ...	42·74 42·29
Butter fat containing 0·56 per cent. free fatty acids	I. 49·3 II. 43·32

In these days of chemical control it is usually the practice to determine the acid value of the oil before neutralisation; this figure will prove a most useful indicator, as the amount of alkali to be used in the subsequent neutralisation can be calculated, at least approximately.

Pure sodium hydroxide is the alkali employed, and a concentrated lye is brought into contact with the oil in special metal containers; the mixture is agitated. The chemical action which ensues is quite simple, being the formation of sodium soaps. After removal of the soaps a neutral oil remains, but it contains traces of soap in colloidal suspension. The majority of refiners effect this removal by agitating the oil with warm water; it is, however, a cumbersome and not necessarily satisfactory process. A better method is to treat the oil with absorbent bleaches, such as fuller's earth or Kieselguhr, and then filter through a press provided with the finest cellulose papers. Fuller's earth is used to a very large extent in the refining industries, and may be said to consist mainly of hydrated silicates of alumina and ferric oxides, together with small quantities of alkali oxides. At one time it was thought that the action of fuller's earth was purely one of oxidation. C. W. Benedict (*Oil and Fat Ind.*, 1925, 2, 62) considers that the bleaching achieved by this absorbent is due to complete absorption, oxidation playing a secondary part in first oxidising all colouring matter before absorption.

It is of interest to note that Craig and Lever Bros. (*B.P.* 224928, 1923) are responsible for an excellent method of combined neutralisation and deodorisation. The process relies upon the fact that fatty acids up to lauric acid, such as nonylic, capric, undecylic, and caprylic acids, can be easily distilled off at reduced pressure in super-heated steam at a temperature of 200° C. Unfortunately, the method only applies to those vegetable oils and fats, the free fatty acids of which consist mainly of the lower saturated acids. The fatty acids are obtained in a pure condition, and can be utilised in the detergent industries.

Reduction of the acid value to about 0·1 per cent. can be achieved by hydrogenation, and also by passing or blowing pure nitrogen through the oil heated to a temperature of 275° C.

Decolorisation.

Nearly all animal and vegetable oils and fats contain certain small proportions of colouring matters; the percentage of these substances relies to a great extent on the method of extraction, thus the first cold expression of olive oil contains less colouring matter than the final exodus.

Chlorophyll and hæmin, the essential constituents of all green plants, are common colouring agents, and are present in olive and other vegetable oils. Another substance responsible for the colour of sesame oil and butter fat is the lipochrome—carotene.

Professor J. C. Drummond (*J.S.C.I.*, 1926, 12-31) gives the following list of important lipochromes responsible for the colour of oleaginous materials and vegetable matter generally.

Pigment.	*Formula.*	*Chief Source.*
Carotene ...	$C_{40}H_{56}$	Green leaves, carrots
Xanthophyll ...	$C_{40}H_{56}O_2$	Green leaves
Lycopin ...	$C_{40}H_{56}$	Tomato
Flucoxanthin ...	$C_{40}H_{56}O_6$	Brown Seaweeds

The present writer is of the opinion that these lipochromes "play some essential part" in edible oils and fats. Although the conclusions arrived at by Professor Steenbock, of America, that the vitaminic activity of certain foodstuffs was proportional to the degree of pigmentation have since been disproved, this cannot be accepted as final. The peculiar physiological action of the lipochromes has never been investigated, and it is quite feasible to suppose that small quantities of these substances might be essential to the human organism, though this might not be apparent over short periods.

It is the object of the refiner to eliminate these colouring matters. As the oils and fats are destined for the manufacture of margarine, confectionery, etc., the use of injurious chemicals, such as are used in the bleaching of oils for the detergent industries, is ruled out.

Hydrogenation.

The best decolorisation method is hydrogenation, and this is especially valuable when applied to vegetable oils. Briefly, it may be said to consist of passing hydrogen into the hot oil, preferably under reduced pressure and in the presence of microscopic amounts of catalytic substances.

A very widely applied oil bleaching is the one embracing the use of absorbents, such as animal charcoal and the various "earths," such as fuller's, Kieselguhr, Kambara, etc. As the process of adsorption is of vital importance to the refining industry it would be of interest to consider the mechanism. It has been mentioned previously that oxidation plays a secondary part in the adsorption—the colouring matter being oxidised before adsorption. The latter process is undoubtedly physical. At one time it was thought that adsorption was due to the formation of a solid solution, whereby the colouring matter diffuses into the charcoal. This theory has now been disproved. The experiments of Schmidt (*Zeitsch. Chem. Ind. Kolloide*, 1907, 2, 3) and other physical chemists have shown that the action is due to surface condensation.

Before the oil can be decolorised satisfactorily it must be quite dry, and it is usual to head the oil in special autoclaves under reduced pressure to effect the elimination of moisture.

The bleaching is conducted in large aluminium or other metal containers. Large quantities of oil, three

(*Continued on page* 130.)

Quality and Value in Cheese

By L. J. LORD

In conclusion, the writer deals with the practical side of his subject in a highly interesting manner.

PART II

Practical Examination of Cheese.

THE GENERAL appearance of a cheese on exhibition is the first thing that strikes one's attention, and while the "finish" of a cheese carries the least number of marks in a competition, or even in appraising its ultimate value in terms of price, yet the sample should claim most of those marks. The particular points calling for examination are not the same way for all kinds of cheese. Some types of cheese should present a perfectly smooth and firm hard rind, while in others a wrinkled, or "netted" melon-like, appearance is desirable.

A Storeroom of Wensleydale Cheeses in a Yorkshire Dairy.

If the cheese is bandaged, the cloth should fit closely and evenly, extending over the edges of the cheese as a protection.

The shape of a cheese should be nearly straight up and down, and of uniform height all round. No cheese should bulge at the sides, unless that is the recognised shape from the mould—*e.g.*, Dutch. Cheeses taken from a straight mould will bulge if they have been put to press too sweet and moist. These will probably be very mild, even "soapy" in taste. Swiss cheese (Gruyère and Emmentaler) bulges a little at top and bottom, as a result of the formation of the "eyes." This is normal to the type, but generally if the ends of a cheese bulge it is a sign of abnormal gas formation. It is often accompanied by bad flavour and leads to cracking of the rind. The gas may be released by piercing the cheese, in a diagonal direction right through, by means of a knitting needle or hat pin. If the ends of a cheese are concave, it is probably due to extreme shrinkage because of insufficient drainage before pressing and subsequent high temperature storage, or simply age. Such a cheese is one for early sale, unless there are special reasons for keeping it.

The Surface.

Whatever special character the surface of a cheese may show, that surface should be clean and complete—*i.e.*, no openings, cracks, or soft spots present. Unclean shelves may not only soil the rind of a cheese, but contaminate it so that mould growth, or decay spores, may obtain a hold. Especially is this so in cheeses which have not a hard rind. No fresh consignment of cheese coming into the warehouse should be placed upon shelves left soiled from a previous lot.

Cracks in the surface of a cheese may be due to faulty manufacture, but may also arise upon an originally smooth rind from allowing the bandage cloth to get wrinkled; or from storage in too warm an atmosphere; or in a dry draughty situation.

Mouldy surfaces occur in, or are aggravated by, warm moist storage, especially where the air circulates badly. Spraying with a formalin solution effects a clearance, after scrubbing down with soap, etc., but the ventilation should be attended to.

Soft putrefying spots on cheese call for a thorough cleansing of cheese and store. Lime washing of walls and ceiling (the lime to be mixed with cement, not with size), and disinfection with formalin is advisable.

"Trying" the Cheese.

A boring iron, or "cheese trier," should be inserted into the top—not the side—of a cheese. A plug of cheese drawn from a flat surface can be replaced neatly, without leaving a faulty scar that cannot be smoothed over. The trier should be inserted to nearly its full length, completing the circular cut before attempting to withdraw the instrument, which should be done with a rotary movement; the plug to be replaced in, as far as possible, precisely the same relation to the bulk of the cheese as it held before boring.

The first thing to do when it is newly drawn is to smell the "taster," and, if holding it to the nose is not satisfactory, the hole from which it is drawn should be smelt. A proper appreciation of the odour of cheese is an important point in judging a number of samples, for the reason that to some extent it enables one to dispense with tasting, a sense that

soon becomes satiated and unreliable. The tongue is better reserved for discrimination between a few excellent samples, rather than it should be applied indiscriminately or upon cheeses whose inferiority will deaden both the sense of taste and of smell if the palate is freely used.

Taste and Odour.

A Cheddar cheese of perfect flavour has an odour somewhat reminiscent of best quality butter, with the elusive aroma characteristic of all cheese. Occasionally a "nutty" aroma and taste is met with, but this seems to be a much-abused term, more often spoken of than experienced. Professor Lloyd speaks of it as being "so much sought after as being the essential characteristic of an excellent Cheddar," and upon meeting with a very marked instance of this flavour he made strenuous efforts both to discover how it arose and how to reproduce it, but met with very indifferent success. The writer has never seen any further report of investigations giving more satisfactory evidence of its general occurrence, and has met with it on few occasions.

Ripe Wensleydale Cheeses of Stilton Type.

Any flavour less than "perfect" is described as "clean," implying that it is free from anything unpleasant in either taste or smell. A "quick flavoured" sample is one with a pleasant aroma, or fleeting taste, that soon passes.

It must be understood that odour and taste in cheese are practically inseparable; you cannot have one perfect and the other faulty, and both are included in the term "flavour."

Cheese flavour should be mild and linger on the palate, but not for overlong, or we are approaching "sharp" and "strong" flavours, when what may be a good flavour is too pronounced.

Faulty flavours cover a wide range of description; from "flat" to "sour," owing to badly judged ripening of the milk and curd; a cheese flavour may be sweet or fruity, bitter, fishy, tallowy—all due to abnormal fermentations overpowering the legitimate lactic ferments; it may be rancid or gassy, suggesting a rotten egg and strong enough at times to tarnish a silver coin held at the plug-hole—these are generally due to contamination in the course of manufacture, with subsequent curing at too high a temperature.

Special flavours are identified with particular varieties of cheese; for instance, the Swiss cheese has a peculiar sweetish flavour characteristic of its type, while other well-known English cheeses are judged upon flavours foreign to a genuine Cheddar.

The Texture and Body of Cheese.

After smelling, and if considered advisable, tasting, the trial plug of cheese, a piece is broken from it, from this being adjudged the texture. This is a matter of the degree of compactness, gauged by the appearance and behaviour of the taster when broken in two.

The texture may be loose or porous, full of tiny gas holes (pin holes) from taint fermentation, badly joined together where it should be well knit—this fault being due to having been in bad condition when put to press.

A satisfactory texture generally shows a flaky appearance when broken. In Cheshire cheese it is more properly somewhat "granular," though not to the exclusion of the flaky construction. In the Gruyère type of cheese, "Swiss" holes of a fairly regular and uniform size are to be looked for.

The piece broken off is now crushed between thumb and forefinger to ascertain the kind of "body" possessed by the sample. This property is sometimes included in that of texture, but they should be considered as distinct from one another. The term "body" is a measure of the consistency of a cheese, and an important point in judging of its probable development and keeping properties.

It is a test not so indicative of quality in the earlier stages of ripening, before a certain amount of digestive fermentation has become established.

In a mature cheese of good quality we expect to find results more or less answering to the following descriptions:

Cheddar should give a smooth, firm plug somewhat resistant to pressure.

Cheshire.—Not quite so firm; more easily broken; inclined to crumble when dry.

Leicester.—"Silky" bodied—smooth, but not so solid as Cheddar—may yield a somewhat "furry" plug.

Lancashire.—Rather inclined to be greasy, breaks with a lumpy fracture.

Wensleydale. — Resembles both Cheshire and Leicester, but not so compact as either.

Gorgonzola.—Tends to present a somewhat waxy body.

(*Continued on page* 136.)

ICE CREAM MANUFACTURE

THE PRODUCT OF TO-DAY — SOME NEW RECIPES

BY E. V. BOYES

IT IS a commonplace that the Ice-Cream Industry has made enormous strides during the past few years. This is because more energy has been put into the exploitation of the machinery and appliances for its production.

More is produced, and the public have been educated to consume more, but a vast amount of leeway has to be made up before our consumption, per head, ever approaches the American. If people can be got into the habit of taking ice-cream even in cold weather, it would rejoice the hearts of the producers, but the object, at present, of ice-cream makers is to induce people to regard the article not alone as something nice to eat, but also as being nourishing and a worthy food product. There is more science devoted to the making of ice-creams nowadays, and a good deal could be written upon the subject. Here the more important points in the fabrication of this interesting confection will be touched upon, so that it will prove a fairly easy matter for anyone to produce a good quality article.

And we will mention a goodly number of varieties too, mostly fashioned from one basis.

The New Ice-Cream.

Formerly, ice-cream was nothing but frozen custard and the higher priced article supplied by a good class of confectioner would contain cream.

These latter were too soft, and they were also too rich. One helping was sufficient, whereas the aim of the present-day mass-production manufacturer is to turn out a cream which can be taken several times a day.

The public are desired to "keep on keeping on" eating the ice-cream. Children will, of course, but adults will refrain if the stuff is too rich.

Without more ado, we will come to the formula of an ice which is sufficiently rich for anyone, yet it is not a mixture to make anyone feel bilious after one or two portions.

This ice-cream was evolved originally at a well-known London music hall, and has pleased all. The Queen and her suite have often enjoyed it, and also many American artistes who should know what good ice-cream is.

The dairy cream can be tasted, but there is not enough to sicken. Take

3 galls. new milk
1 gall. cream
3½ lbs. granulated sugar.
8 ozs. arrowroot.
6 ozs. gelatin
4 fl. ozs. vanilla bean essence.

The gelatin should be powdered or else be in thin sheets. The best way of heating the milk is in a double milk boiler, then it cannot burn. First mix up the arrowroot in a basin with sufficient cold milk to form a batter, heat about a gallon of the milk in the boiler with the sugar and gelatin, and when near boiling, stir arrowroot in. It will thicken and can then be run through a fine hair sieve in case there should be any little lumps. Pour out in a shallow pan to cool, then add the rest of the milk, the cream, and vanilla essence.

Sweetening.

This "mix" must always be cold before it is frozen, and if wanted quickly at any time, then it may be cooled by standing the pan on ice.

The above furnishes a very nice ice indeed, firm without being heavy, nicely flavoured, and with the real creamy taste. Nor is it too sweet, although, if desired, more sugar may be included. Some ices give a taste of only the sugar and vanilla, and such are not good. Americans like more sugar than we do, thus American formulas, when operated here, are apt to produce too sweet an ice-cream—for adults.

In the old days, when sugar was around 11s. cwt., and there was less science and precision in ice-cream making, more sugar was added because it was cheap. It was employed as a "filler" as well as a sweetening ingredient. The more the sugar, then the longer the "mix" takes to freeze, and this, naturally, implies more ice. The vanilla essence should be free from coumarin. American vanilla essences are not good, being on the coarse side through the use of coumarin. Years ago, when vanilla beans were very expensive, it became the custom to cheapen the vanilla beans by the addition of tonka beans, and the Americans still continue this practice, generally using the synthetic coumarin instead of the tonka beans.

Such mars the delicacy and subtleness of the vanilla flavour and odour, and gives a hay odour instead. The cream, to economise, is generally of the "reconstituted" variety, as this saves a good deal of money, and an emulsor is necessary. The reconstituted cream is made from butter, milk powder, etc. The makers of the emulsors furnish information as to quantities of butter and milk powder necessary, as, of course, cream can vary in richness, and sometimes a cream with 20 per cent. butter fat may be needed, and 30 per cent. or more at other times. Some ice-cream factories cheapen the reconstituted cream by including coconut oil (fat), or other grease, for whole or part of the butter, but good margarine would be the best.

To freeze the foregoing "mix," the freezer is filled only about halfway up with the mix, as allowance has to be made for "swell or over-run." Some freezers will turn 4 gallons of mix into about 8 gallons of ice-cream by beating air into the batch, though sometimes the latter will sink again as the air becomes released by pressure.

Ice Practice.

If using ice, put the mix in the freezer pan and allow to stand some time if possible. Break the ice in pieces the size of walnuts, and on each layer of ice stew a plentiful topping of freezing salt, then ram down well. It should freeze in half an hour. The "iceless" freezers are the least tiresome, as the maker is independent of ice, but they cost more. The "mangle" style of freezer is satisfactory for many purposes, but it must be remembered that no "swell" (over-run) is obtained. This is a very important consideration to bear in mind.

The above mix of ours will give more swell if, about halfway through the freezing operation, six well-beaten raw eggs are added. The eggs will also improve the tint of the cream, but a "greenery yallery" colour looks common, therefore a little burnt sugar is the best colouring (for a rich creamy tint), and it should be well diluted with water previously.

We claim that the above ice-cream is as good as anyone desires as a "come again" ice, but a variation is to use 1 gallon more milk and one-fourth extra of sugar, gelatin, arrowroot, and essence to equalise.

This will cheapen, although few people have noticed the alteration when it has been done.

A Cheaper Ice.

A good many people use ice-cream powders, made of cornflour, gelatin, sugar, colour, and flavour, but we have yet to see I.C.P. (ice-cream powder) make really choice ice-cream.

Now will follow a cheaper ice (*ice*, not ice-cream) in case such should be needed.

It is a cheap affair, admittedly, but has been very well spoken of. It was even considered "the best" in one town, the other makers both using ice-cream powder, because they thought it was the only way.

6 galls. new milk
5 lbs. sugar
1 lb. cornflour
8 ozs. gelatin
8 ozs. vanilla powder
8 beaten raw eggs.

This was made as before, the flavouring sugar being added to the hot mix just before passing through the sieve. The raw eggs are added, as above, when half through the freezing, and a little burnt sugar may be included as extra colouring.

Vanillin sugar is an exceedingly inexpensive flavouring and is prepared for the above by using 24½ ozs. each of sugar and cornflour, and 1 oz. 100 per cent. vanillin. Mix, sift, and keep in a tin for use as required.

For strawberry or raspberry (in the first recipe) add ½ oz. only of vanilla essence (to round off), and about 4 ozs. of either strawberry or raspberry essence. Tint faintly with cochineal or confectioners' "cream pink."

In the second mix (just given) for raspberry or strawberry, add 2 ozs. only of the vanillin powder, and 5 or 6 ozs. raspberry or strawberry essence, according to strength.

(To be continued.)

(*Continued from page* 134.)

Cheeses of inferior body may be described as "salvy" or "pasty" when too soft and sticky; soapy, if soft and at the same time close in texture with an insipid flavour. A "weak-bodied" cheese is moist and soft and indefinite generally.

Overdry cheeses become mealy or corky in body, or gritty, according to the original condition of the cheese when stored.

The Colour of Cheese.

A plug of cheese held up to the light should show some degree of translucence, a thin slice letting some of the light through.

Some varieties, in which annatto extract is used as a colouring agent, are apt to be mottled, due to careless work in the making or possibly unreliable colour extract. Cheeses may be "seamy" in colour, where the junction of the original pieces of curd can be seen, due to the uneven absorption of salt. Sometimes the fault lies in the salt, sometimes in the original milk, necessitating particularly careful work.

Of the uncoloured, or white, cheeses, Cheddars exhibit a light shade of amber; Gruyère or Emmentaler a peculiar opalescent white; Stilton and Wensleydale a faint creamy white; Roquefort a dull opaque white; and Gorgonzola a cream-white tending to waxy yellow.

Discolorations such as red or rusty spots are caused by a fungus mould infection; sometimes a black-spot mould is found. A discoloration shown as a pink flush is seasonal in some localities in spring cheese-making, and is probably allied to the "rusty spot" trouble. Indirectly this would appear to be due to lack of the proper cheese ripening organisms, for as the season advances and the latter gather strength the trouble will disappear.

Stilton Cheeses, showing the Veining of Blue Mould.
Photo by favour of the Royal Agricultural Society of England.

The Pectin Controversy

An important review relating to a much debated subject by Dr. W. Clayton, Chief Chemist and Bacteriologist to Messrs. Crosse and Blackwell, Ltd., London.

MODERN FOOD chemistry reacts strongly to progress in research in Colloid Chemistry and no particular field illustrates this fact more than that dealing with fruit jellies, jams, and marmalades. These products are at once familiar and complex, apparently easy to manufacture and yet, until recently, empirical in their scientific foundation.

The fundamental study concerns the system: sugar-pectin-aqueous solution of acid, and a mass of published work is now available on the subject. Jelly formation results only over a definite equilibrium range of the system and is affected by such factors as temperature and ion concentrations. The total titratable acidity is not the essential factor, but the actual hydrogen-ion concentration (expressed conveniently as the pH value).

Experience has taught that certain fruits readily make into fruit jellies or jams, their content of pectin and fruit acid being sufficiently high—*e.g.*, sour apples, acid plums, and gooseberries. Other fruits are deficient in pectin (ripe strawberries), and need enriching with a pectinous juice in order to insure jellying.

The older practice of adding apple juice or gooseberry juice to jams is an instance of enriching with pectin. The practice is increasingly common of adding the pectin itself, usually apple pectin or a citrous pectin—*e.g.*, lemon. The importance of such art is reflected in the growing patent literature on the subject and in the legal battles resulting. The appearance of a book* devoted to pectin is, therefore, opportune and of interest to all food chemists. Immediately, however, it should be made plain that the title is a misnomer, the subject-matter, apart from patents, dealing solely with apple pectin. Pectins of citrous origin are not considered.

The style of the book is irritating, double superlatives are frequent, sentences are incomplete, and spelling and other errors are too numerous for a work of this size. Mr. Rooker writes with evident experience and enthusiasm of the preparation of apple pectin, detailing the various steps: grinding and pressing the apples; drying the pomace; leaching the pomace with cold water; extracting the pectin; pressing the treated mass; clarification of the pectin juice by sedimentation, centrifugal separation, and enzymic treatment; decolorising, filtering, and concentrating the pectin solution; adjusting the finished syrup as to acid content and jellying power; bottling and canning the syrup, followed by pasteurisation.

The technical steps are clearly explained and then a brief statement follows regarding the preparation and properties of powdered pectin. Nine pages only are devoted to the very important study of the chemistry of jelly-making. This chapter is a distinctly weak point in the book. Surely a comprehensive summary should have been presented of the excellent work done by the Delaware Station Laboratories in America and by Mehlitz, Wendelmuth, and others.

No mention is made of the use of pectin in jams or marmalades from a practical point of view, although two generalised recipes are given (p. 108). The book is a disappointment on this aspect of pectin.

Chapter xi., on New Uses of Fruit Pectin, briefly outlines the use of pectin as an emulsifying agent for preparing pharmaceutical and essential oil emulsions and salad dressings. Exceptional emulsion stability is stated to follow the use of pectin. Its value in horticultural emulsions is related to its high adhesive and wetting properties. Pectin is also being used in special glues and adhesives, confectionery, and, finally, as a blood agglutinant.

The second portion of the book is a highly interesting summary by Mr. Daughters of the technical aspects of important patents on pectin. Whilst no patent claims are set out, there is extensive quotation from the texts of the patents of the salient features involved.

Although the art of jelly-making was known as early as 1750, according to a standard cookery book of that time, pectin was not discovered until 1825, by Braconnot. Various workers studied pectin until in 1909-1910 Miss Goldthwaite published her investigations on the equilibrium conditions of pectin jellies. Research since then has proceeded rapidly both on the organic chemistry and the colloid chemistry of pectin and its jellies.

According to Daughters the first important commercial use of pectin was protected by Boyles in U.S. Pat. 1,067,714 of July, 1913, to be closely followed by the patent granted in the same year to R. Douglas (U.S. Pat. 1,082,682). This patent concerned the preparation of an apple pectin free from sugar, capable of being concentrated to a syrup, and is usually regarded as the fundamentally basic patent on the subject.

Daughters deals with twenty-seven patents granted between 1913 and 1928, and provides a very valuable résumé for the technical chemist, who should indeed be thoroughly familiar with this branch of practical food chemistry.

Rooker's book will appeal to the younger men taking up the study of food chemistry, giving them a basis for wider reading of the journals later. The specialist, however, will be disappointed that the treatment has not been expanded beyond the purely elementary stage. When the author informs us that the estimated combined output of liquid and powdered pectin in the United States alone in 1928 reached about two million pounds (calculated on a powder basis), we feel regret that he has not made more use of his opportunity beyond reprinting what he has already published as monthly articles in the *Fruit Products Journal*.

WILLIAM CLAYTON.

* *Fruit Pectin*. By William A. Rooker, including a chapter on patents on the manufacture and use of pectin by Milo A. Daughters. Avi Publishing Company, New York, 1928. Pp. ix + 170 Price $6.00.

ENGLISH CANNERS CONVENTION IN JUNE.

THE TWENTY-SECOND meeting of the American Canners Association was held at Chicago last January, and as far as is known the business of the convention was in no way disturbed by marauding gangs. Undaunted by Siberian weather, the visitors to the Stevens Hotel would seem to have spent a saturnalian fortnight revelling in banquets and symposiums

Colossal Trade Impetus.

According to the American Canning Press the increased business resulting from this convention amounts to millions of dollars—reaped mostly by makers of food plant. No doubt the Canners enjoyed themselves very much, picking each other's brains, as they say, and the papers read by works chemists were doubtless the result of months of fond preparation.

But if even Chicago is only just getting its second wind after January's upheaval, it does not seem probable that the Food Canning Council's Third Annual Convention in the Corn Exchange, Cambridge, on June 25, 26, and 27 of this year will be noticeable for any similarity to its American counterpart, for the enthusiasms of Chicago are hardly those of Cambridge.

Cambridge.

The English town has a medieval air. In the glory of the English Renaissance it nurtured the mind of the Olympian to whom we owe *Hero and Leander*; its modern expression is to be found in the cultured measures of Rupert Brooke. This is the setting for our Canners Convention this summer. The principal objectives are:

1. To collect and collate information as to the treatment of products; to organise investigations at home and abroad and to advise as to the most suitable operations for various parts of Great Britain.
2. To secure the interest and activity of the Government and Parliament in this branch of agricultural development, and in particular to advise as to the application of subsidies or other forms of financial assistance.
3. To interest growers and others in the establishment of local canning schemes.
4. To further the exchange of technical and scientific information and assistance.
5. To encourage the manufacture of specialised and improved machinery and appliances in Great Britain.
6. To act as a common centre of advice and help for Tinplate Manufacturers, Can Makers, Plant Manufacturers, Growers, Bankers, Distributors, and the Public in the expansion of a serviceable and flourishing industry.

The dominant genius of this movement is Sir

(*Continued on next page.*)

CANDY—THE ENERGY FOOD!

Enquiries and Correspondence

The Editor would welcome a free use of this page by readers who have matters of food interests to discuss.

Enquiries

52. Wanted: Any literature on the manufacture of Chewing Gum. Messrs. Kawe, Shokoladi Vabrik, Tallinna, Esthonia.

53. "We would be indebted to you if you could get us in touch with any manufacturer of an Onion Peeling Machine, capable of peeling onions from the outer skin for the purpose of manufacturing pickled onions, the machine if possible to peel the onions to a uniform size."

54. "We shall be glad of any literature that you can recommend to us on Cream, particularly Canned Cream."

55. "As regular readers of your journal, may we ask the favour of your advice? Some months ago we had specially constructed a number of cabinets for the sale and storage of biscuits. The cabinets are so made that they allow for the circulation from a heating chamber of warm dry air, in order to keep the biscuits perfectly crisp. Unfortunately, we omitted to specify the type of wood which should be used in the construction of the cabinet and drawers, and the joiner has used pitch-pine throughout. The result is that as soon as heat is applied, the smell of the oil in the wood is accentuated and readily absorbed by the biscuits—which taste "woody." We have endeavoured to remedy the trouble by subjecting the drawers to heat and also by painting, but have been unable to find a satisfactory solution of the difficulty.

"We think it likely that one of your readers might be able to suggest a paint or some other material which would effectively seal the oil in the wood. We have thought of lining the drawers with metal, but the cabinet is so constructed that it would be impossible to do this throughout, and therefore we still think the odour would percolate from the exposed wood into the open drawers.

"We should be grateful if you could help us in this matter."

(We shall be glad to put those interested in touch with the enquirer.)

Correspondence

Sir,

In the article in the February issue of Food Manufacture on the Soya Bean Flour the writer mentions gunpowder as another product which the West owes to China. This is hardly accurate. Incendiary compositions were undoubtedly known in China and the East, and the Crusaders brought back knowledge of them. But gunpowder, in the modern sense, probably owes its greatest development to Berthold Schwartz, a German monk, who is also generally credited with the first firearms. There were powder-works in Western Europe as early as 1340, and it is probable that the use of powder as a destructive agent became known in the East through Western sources.

I am, sir, etc.,
F. W. B.

(The following is an extract from Chap. xlviii. of *A Short History of the World* by H. G. Wells.

In the thirteenth century, Turkish people from the country to the north of China rose suddenly to prominence in the world's affairs, and achieved such a series of conquests as has no parallel in history. These were the Mongols. They had shaken themselves free from Chinese dominion, and brought a number of other Turkish tribes into a military confederacy. Their central camp was at Karakorum in Mongolia. In 1214 Jengis Khan, the leader of the Mongol confederates, made war on the Kin Empire and captured Pekin (1214). He then turned westward and conquered Western Turkestan, Persia, Armenia, India down to Lahore, and South Russia as far as Kieff. He died master of a vast empire that reached from the Pacific to the Dnieper.

His successor, Ogdai Khan, continued this astonishing career of conquest. His armies were organised to a very high level of efficiency, and they had with them a new Chinese invention, gunpowder, which they used in small field guns. He completed the conquest of the Kin Empire and then swept his hosts right aross Asia to Russia (1235), an altogether amazing march.

So that if we have erred, it is in good company.—Ed.)

(*Continued from previous page.*)

Edgar Jones, who is doing for Preserving and Canning what Lord Melchett did for another British industry.

From the Programme.

On the first day of the exhibition, which falls on a Tuesday, a lunch is being given by Messrs. Chivers, and after it there will be a visit to that firm's laboratories at Histon, which is quite near Cambridge. The general conference will also be on the first day. There are to be numerous other meetings on the second day (Wednesday) and a dance has been arranged for the evening. The programme for the last day includes a visit to Messrs. Smedley's new pea factory at Wisbech.

The whole affair is anticipated to be incomparably greater than last year's convention at Worcester. We ourselves are to have a stand at Cambridge and look forward to meeting old friends and new. In view of the fact that beyond all doubt *Canning is our most expanding industry*, this convention will be to many a supreme business opportunity; viewed in a broader sense it will be an event of national importance.

Recipes

Fancy Egg Fruit Beverages

By E. V. BOYES

PART III

Citronade.

160 ozs. citron or lemon syrup.
64 ozs. lime fruit syrup.
32 ozs. pineapple syrup.
16 ozs. cider or wine.
8 ozs. phosphatic acid solution.
16 lbs. eggs.

Mix as before. The cider or wine should be of good quality. These beverages may be taken neat, or diluted with plain or soda water. In the latter case the glass is filled about one fourth with the neat beverage, then filled up with the water.

Elderette.

128 ozs. elderberry syrup.
64 ozs. black cherry syrup.
32 ozs. quince syrup.
32 ozs. lemon syrup.
16 ozs. cider or wine.
8 ozs. phosphatic acid solution.
16 lbs. eggs.

Strawberryade.

224 ozs. strawberry syrup.
16 ozs. pineapple syrup.
16 ozs. vanilla syrup.
16 ozs. cider or wine.
8 ozs. phosphatic acid solution.
16 lbs. eggs.

Tutti-Frutti.

128 ozs. lemon syrup.
64 ozs. sweet orange syrup.
64 ozs. vanilla syrup.
16 ozs. cider or wine.
8 ozs. phosphatic acid solution.
16 lbs. eggs.

Mix. The next is a combination far better than vanilla alone.

Vanilla.

192 ozs. vanilla syrup.
32 ozs. lemon syrup.
32 ozs. sweet orange syrup.
16 ozs. cider or wine.
8 ozs. phosphatic acid solution.
16 lbs. eggs.

Mix. The next and last is a good general flavour which has been offered from soda fountains at exhibitions and other places where great numbers of visitors are expected. It is no finer than the others, however.

World's Fair.

64 ozs. lemon syrup.
64 ozs. black cherry syrup.
64 ozs. vanilla syrup.
64 ozs. syrup of roses.
16 ozs. cider or wine.
8 ozs. phosphatic acid solution.
16 lbs. eggs.

The Fruit Syrups.—Concentrated fruit syrups, prepared specially for beverage making, such as soda fountain drinks, will answer our purpose. They are let down with three or four parts of plain syrup to one of the concentrated or according to the maker's directions, then approximate ordinary fruit syrups in strength. Over-flavouring with the fruit juices is a good feature. The plain sugar syrup is by boiling 48 lbs. of sugar (mineral water maker's quality) in 4 galls. water and straining. Such syrup can be flavoured with fruit juice to make any variety; or the concrete fruit juices, mentioned previously, may be added.

Or a synthetic syrup may be used, this being composed of plain syrup, acid, colour, and sufficient essence. If a "compound" essence is used, it contains a proportion of real fruit juice. For best goods, use citric acid, and for other purposes, tartaric acid, although other available acids are matic, phosphoric, lactic, and acetic, but they differ in strength or acidity.

Ginger syrup can be formed by flavouring plain syrup with essence of ginger. Some essence of lemon may be added, or else lemon syrup, to improve.

Grapefruit syrup is made with 2 pts. grapefruit juice to 6 pts. plain syrup.

Limefruit syrup is the same as limejuice syrup, and can be made with 1 gall. plain syrup, 2½ ozs. citric acid, and enough essence of limes to flavour. Or it may be made with filtered limejuice instead of above grapefruit juice. Muscatel syrup can be made from grapes, or raisins, or essence of muscatel may be added to plain syrup.

Orange flower syrup is 4 plain syrup and 1 orange flower water, or plain syrup may be flavoured sufficiently with 1 dr. neroli oil dissolved in 3 drs. of spirit.

Syrup of roses can be made by infusing rose petals in plain syrup to give it a rose flavour and odour, but a quicker method is to dissolve 12 drops rose otto in 2 drs. spirit, and add to 1 gall. of plain syrup.

Vanilla syrup may be formed by adding real essence of vanilla bean to plain syrup, or the syrup may be flavoured with vanilline essence, or even vanilline sugar.

AS A RESULT of the increase in the production of sugar in Cuba, some of the Czecho-Slovak refineries may have to close their doors.

Why the Statue of Liberty Winked.

A patent drink stand, to hold eight bottles of liqueurs and to recork them automatically at the end of an evening, was recently submitted to the United States Patent Office, and—the patent was granted.

Now we understand the fury of those on board the U.S. cutter when Captain Randell refused to surrender his cargo.

Champagne.

A report published by the Rheims Chamber of Commerce says that the wine industry is flourishing. During the last half of 1928 the number of bottles of champagne dispatched was 13,294,061, an increase of 2,400,000 on the second half of 1927. For the whole year the figure is 24,069,373, out of which 10,808,923 bottles were for France and 13,260,450 for export.

Imperial Canada.

Whereas in 1927 Canada exported 11,712,352 lb. of canned vegetables to Britain valued at $860,567, in 1928 the figure reached 15,815,879 lb. and the value topped the million mark at $1,093,125. At the same time, Canada is sparing no effort to divert trade from the United States into Empire channels.

New Cold Storage Method.

From Canada comes the suggestion that a new and improved way of preserving meat in cold storage is by very rapid freezing.

It has been noticed in Labrador that fish taken out of the water into extremely cold air stiffen at once, but swim away again in a short time if put back.

Slow freezing, on the other hand, would have quickly killed them by bringing about a change in the structure of the flesh, which also spoils the flavour.

Gold Coast Cocoa Exports.

The Gold Coast Government Commercial Intelligence Bureau in London report that exports of cocoa from the Colony during March amounted to 28,247 tons.

Skyscraper Tariffs.

A Stockholm correspondent of the London *Financial Times* says that the Swedish Chamber of Commerce in New York has advised the Federation of Swedish Industries and the Swedish Government that it considers it of the greatest importance to point out to the American Government that Sweden cannot accept the changes in the American tariff without protest, as they will exclude numerous Swedish export products from the American market. The Czecho-Slovak Government has suggested to the Swedish Government that it should consider the possibility of organising European tariff reprisals against America, making a start with a heavy duty on American films and motor-cars, which are the most vulnerable products in America's export trade. At the same time, the newspaper *Sjoefartstidende*, at Oslo, recently published a long article by the Secretary of the Norwegian Exporters' Federation suggesting joint action between Norway, Sweden, and Finland against American tariff aggression, adding, "Great Britain, France, Holland, and Belgium have the same interests as we, and Norwegian, Swedish, and Finnish co-operation might subsequently be enlarged to include these countries also."

Openings for British Trade.

The Department of Overseas Trade has at its command an extensive overseas Intelligence system which comprises the Commercial, Diplomatic, and Consular Services in foreign countries and Trade Commissioners and Imperial or other Trade Correspondents in the Empire, says *The Board of Trade Journal*.

From this Intelligence Service information on all subjects of commercial interest is received at the Department, where it is collated and classified in a form convenient for reference, and is available to any British trader upon personal or written application to the Department at 35, Old Queen Street, Westminster, London, S.W. 1.

The information at the disposal of the Department is of a widely varied nature, and includes such matters as the following: Sources of supply, prices, etc., of trade products; Foreign and Colonial contracts open to tender; general conditions prevailing in Overseas markets; demand for particular articles abroad; nature and extent of foreign competition, and suggestions for meeting it; methods of distribution and marketing; credit conditions, terms of payment, etc., abroad; firms at home engaged in particular lines of business; firms or individuals considered suitable to act as representatives or agents for British firms; Foreign and Colonial Tariff and Customs Regulations; statistics of Imports or Exports; forms of Certificates of Origin; regulations

concerning commercial travellers; Consular Invoices; shipping and transport, etc.

A monthly list of openings for food products will appear on this page.

Openings for Food Products.

Textiles and Groceries.—A commission agent of **Mexico City** is desirous of securing the representation of British firms manufacturing all forms of textile goods, hosiery, laces and groceries (particularly sauces). (Ref. No. 277.)

Foodstuffs in General.—An agent established at **Brussels** is desirous of obtaining the representation of British manufacturers of the goods mentioned above. Correspondence may be in English. (Ref. No. 259.)

Apples and Oranges.—An agent in **Leipzig** desires to secure the representation, on a commission basis, of British exporters of apples from Australia and New Zealand and oranges from the Union of South Africa. The agency would cover the Free States of Saxony, Thuringia, and Anhalt. (Ref. No. 262.)

Codfish, etc.—An agent in **Sao Paulo** is desirous of getting into touch with British exporters of codfish, saithe, ling, haddocks, etc., with a view to their representation. (Ref. No. 275.)

Biscuits, Chocolates, Jams, Hams, Bacon, Tea.—A firm of general merchants established in **Cairo** desire to secure the representation of British manufacturers of the above-mentioned goods. (Ref. No. 268.)

Provisions, etc.—A commission agent in **Teneriffe, Canary Islands,** wishes to obtain agencies for British manufacturers and exporters of all classes of provisions, including jams, hams, bacon, cheese, jellies, sweets, etc. (Ref. No. 308.)

Soya Oil, Soya Beans, Palm Kernels, Copra, Palm Oil, and Cocoa Beans.—A well-established firm of commission agents in **Danzig** desire to obtain the representation of British manufacturers or exporters of the above. (Ref. No. 288.)

Coffee; Fats.—A commission agent in **Danzig** desires to obtain the representation of British exporters of the above. (Ref. No. 289.)

Coffee, Sugar, Pepper, Cotton-Seed Oil, and Colonial Produce.—A **Leghorn** agency firm desires to secure the representation of British exporters of the above. (Ref. 298.)

Germany.

A very full survey of the facts of German economic and financial life is provided in a collection of *Official Documents* (XIXA) now issued by the Reparation Commission. It consists of reports of the various Commissioners and Trustees concerned with the German Railways, the Reichsbank, Controlled Revenues, Industrial Debentures, and German Railway Bonds. The figures and diagrams they provide give an unrivalled insight into the present day situation.—H.M.S.O. 3s., 3s. 6d. post free.

"Loss Leaders" in American Stores.

A strange situation has arisen in America with regard to what is known as the running of "loss leaders" by chain-store operators, which means, briefly, that multiple grocery stores advertise from time to time, in one or other of their stores, the sale of some widely known food-product as being sold at, say, half-price, this attracting large numbers of additional customers. Of course, the deficit on the "loss-leader," which is soon sold out, is more than justified by the total increase of business, but the result is nearly always that the commodity in question tends to fade out of the local picture.

The food manufacturers have paid enormous sums in creating goodwill for goods by advertising, and the stores turn the value of this asset to their own advantage. We cannot understand why the manufacturers continue to sell their best lines to the people who are apparently destroying their business, but the fact remains that nationally advertised foods are everywhere dropping out of the market, and the position seems to us an extraordinary one.

Norway's Canning Industry.

Recently a meeting was held at Stavanger to discuss the matter of securing a betterment in the turnover of the Norwegian canning factories. It was decided to establish a "price council," which, in turn, will determine the minimum price to be placed on export goods, and decide on questions pertaining to production, etc. A general purchasing department will also be established by the industry.

A committee formed by the industry some time ago to study the problems reported its findings and made its recommendations. These have not yet been made public, but it is reported that an attempt will be made to regulate the market and create more favourable tendencies in the turnover of canned fish through purchase of the canned products; for example, during a falling market as a result of a heavy catch. Production will also be controlled by limiting the number of new factories and enlarging those already in operation.

Hawaiian Pine-apple Pack Expected to be Short

The winter crop of pine-apples in the Hawaiian Islands was below average, and the year's pine-apple pack is expected also to be short, according to information from the Honolulu Chamber of Commerce.

Maple Sugar in Canada

With the approach of spring in Eastern Canada, the sap is running in the maple-trees. Last year the quantity of maple sugar and maple syrup produced in Canada was valued at $5,584,588. Of this total, 13,798,109 pounds of maple sugar was valued at $2,269,686 and 1,686,583 gallons of maple syrup at $3,314,902. The Province of Quebec is the chief source of supply with Ontario the next largest producer. Nova Scotia and New Brunswick account for comparatively small quantities of each product.

There has been a great improvement in recent years in the process of sugar making. The replacing of the open sap buckets and the old sugar kettle by the modern covered pails and rapid-working evaporators has raised the quality both of the syrup and the sugar.

Trade News

RAPID PROGRESS has been made with the exhibition to be opened on the Town Moor, Newcastle-upon-Tyne, on May 14 by His Royal Highness the Prince of Wales. It is called the "North-East Coast Exhibition," as it has the support of all the towns surrounding Newcastle-upon-Tyne.

The ground occupies one hundred acres. There are two very handsome buildings, one termed the Palace of Industries and the other the Palace of Engineering.

Foodstuffs will make a very imposing display. In the Palace of Industries, A. S. Wilkin, Limited, Cremona Park, Newcastle-upon-Tyne, will show the manufacture of their well-known Cremona toffee. A

General View of the North-East Coast Exhibition, Newcastle-upon-Tyne.

display of Bero flour will be shown by Thomas Bell and Son, Limited, Newcastle-upon-Tyne, while biscuits will be prominently exhibited by L. Wright and Son, Limited, South Shields. Tinned fish and fruit will be shown by Angus Watson and Company, Limited, Newcastle-upon-Tyne, and an interesting show of confectionery will be made by Watsons, the well-known toffee manufacturers. Another good display will be that of W. M. Livens and Company, Limited, of College Pure Sweet Works, Newcastle-upon-Tyne. Fox's Glacier Mints, Limited, of Leicester, the Bantam Products, Limited, of Leeds, and Carr and Company, Limited, of Carlisle, are to be well represented. Wilts United Dairies, Limited, will demonstrate their well-known lines, and another interesting stand will be that of the "Cow and Gate Milk Food Bureau." Juvels will be demonstrating their bakery products.

In the Palace of Engineering, Hunters the Bakers, Limited, of Gateshead, are to exhibit a working bakery for the purpose of demonstrating the production of Swiss rolls, sponge sandwiches, English meat pies, sausage rolls, etc.

Mr. Albert Fella, the prominent ice-cream manufacturer of Glasgow, will serve this popular delicacy to visitors from a number of kiosks.

We can only hope that the summer weather is going to be such that these kiosks will stand in constant danger of being stormed by sun-tortured visitors.

The refined glycerine business which has been separately conducted by Messrs. Lever Brothers, Joseph Crosfield and Sons, William Gossage and Sons, and Chris. Thomas and Brothers will, as from May 1, be merged into a new company under the title of "Glycerine, Limited," with offices at Lever House, Blackfriars, E.C. 4. The new company will assume responsibility for the execution of all outstanding contracts entered into by individual firms whose interests are now vested in "Glycerine, Limited."

* * *

A completely new book has just been issued on the subject of portable electric hoists; a book replete with pictures showing practical applications together with technical data relating to speeds, dimensions, weights, and so on. It is published and copyright by Herbert Morris, Limited, of Loughborough.

* * *

Novelties in chocolate and confectionery by firms on the Continent will be shown at the Bakers and Confectioners Exhibition due to be held at the Agricultural Hall, Islington, in September.

Those in the trade might well consider introducing some of these lines into their own range of products.

* * *

Amongst the trade literature that has come our way recently, nothing has attracted us more than a brochure of Williams (Hounslow), Limited, illustrating very simply their range of edible colours.

Messrs. Williams, who have been specialists in this line for over fifty years, supply all colours, which they claim to meet the most stringent demands of the Health Authorities.

* * *

In an article published in the last issue of FOOD MANUFACTURE it was stated that "Duriron," an acid-resisting compound, is marketed by "Sir S. W. Royel and Company, Limited." This should have read "Sir S. W. Royse and Company, Limited, Albert Square, Manchester."

* * *

According to an announcement recently made at Ottawa, between 4,000 and 5,000 bushels of "Garnet" wheat is being sacked at Fort William for shipment to London, where it is to be distributed to British millers and to a representative miller in Germany, for the purpose of obtaining reports on this new early ripening variety of wheat. It is expected that complete reports will be available before the 1929 crop is ripe. It is stated that all the reports so far from both Great Britain and the United States have been satisfactory to "Garnet" wheat, but reports from Canadian millers have not been so favourable, with the result that this variety has not been graded as Number 1.

Commercial and Legal News

(The Editor does not accept responsibility for any errors which may occur in the following notices.)

PECTIN CASE.

JUDGMENT GIVEN

MR. JUSTICE ROMER, in the Chancery Division on March 26, delivered his reserved judgment in the action brought by the Douglas Packing Company (Inc.) and the Cetro Corporation of Rochester, New York State, against William Evans and Company (Hereford and Devon), Limited, Widemarch, Hereford, to restrain an alleged infringement by the defendants of plaintiffs' patents for the improved manufacture of pectous compounds used in jam and jelly making. Plaintiffs also asked for an inquiry as to damages and delivery up for destruction of all infringing goods. Defendants denied infringement, and said the patents were not valid and that there was a lack of novelty by reason of prior user and publication and common general knowledge.

Concentration without Jellification

His lordship reviewed the earlier processes of jam and jelly making, and then dealt with the plaintiffs' first patent, which he said was for an invention that effected an economy of time and expense and preserved the flavour and colour of the fruits. Concentration without jellification was the keynote of the specification, and it was based upon the removal from the fruits of most of the natural sugar. No such compound had been previously produced, and it had been a great commercial success. If the invention was so obvious, as the defendants alleged, many manufacturers had lost an obvious source of income. The defendants had failed to establish prior user or any of their other attacks on the validity of the first patent, and he therefore held that it was valid. As to the alleged infringement by the defendants of that patent, the onus of proof was on the plaintiffs, and they had failed to discharge it. He accepted the evidence of the defendants that their compound was not concentrated, and if the plaintiffs, in their experiments, had not been able to obtain that compound without concentration, they must have used a different cloth or shown less skill than was employed in the defendants' manufacture.

Removing Turbidity

The second patent was to remove turbidity caused by starch, and with regard to it his lordship held that the plaintiffs' discovery was the obvious thing to try, and that the patent was bad for want of subject matter.

His lordship said the action failed and must be dismissed. The defendants would be given the general costs of the action except so far as they had been increased by the issue as to the validity of the first patent on which they had failed. His lordship, however, suggested that the defendants should have two-thirds of the general costs of the action, and this was agreed to.

London Gazette Information

Joint Stock Companies.

At the expiration of three months, the names of the undermentioned companies will, unless cause is shown to the contrary, be struck off the Register, and the companies will be dissolved:

Stogumber Brewery Company, Limited.
Arello Food Products, Limited.

The names of the undermentioned companies have been struck off the Register:

Burton Bottlers (Blackburn), Limited.
Gresham Wine Company (1924), Limited.
Kent and Sussex Creameries, Limited.
British Lactic Products, Limited.
Sandow's Cocoa and Chocolate Company, Limited.
Amalgamated Clubs Brewery Company, Limited.
Anglo-Dutch Trading Company (Amsterdam, Holland), Limited.
British Liqueurs, Limited.
Castell del Remey Wine Company, Limited.
Coleman's Tonic Cocoa Company, Limited.
White and Company (Food Products), Limited.

Voluntary Liquidation.

(Note.—Voluntary liquidations may, in some instances, refer to companies in course of reconstruction.)

SLATE FLOUR, LIMITED. Resolved March 21 that the company cannot, by reason of its liabilities, continue its business, that it be wound up voluntarily, and that Mr. Alex. Parkes, Corporate Accountant, 314-317, Moorgate Station Chambers, E.C. be appointed liquidator.

"W. WOODHAMS AND COMPANY," "WALKER AND WALTON," and "F. SMYTH AND COMPANY." (F. M. Smyth, G. Woodfall, T. B. Woodfall, and F. Smyth), carrying on business as British Wine and Vinegar and non-alcoholic Wine Merchants and Foreign Wine Merchants, at Copeland Road, Peckham, under the above styles. Mutual dissolution as from March 31. Debts by F. M. Smith and G. Woodfall, who continue the business.

New Companies

BERNARD (CONFECTIONERS), LIMITED. (237562) Regd. March 1, 1929. 5, Carlisle Avenue, E.C. 3. To carry on the bus. of confectioners, etc. Nom. Cap.: £500.

E. BEANES AND COMPANY (1929), LIMITED. (237635) Regd. March 4, 1929. To acquire the undertaking, including goodwill, of the bus. of brewers' grist mnfrs., as cd. on by E. Beanes and Company, Limited, and to carry on the bus. of mnfrs. and sellers of brewers' grist and certain other preparations known as "Senaeb Food" and "Peptasine." Nom. Cap.: £5,000.

DELECTABLE DUCHY CAKE SHOP, LIMITED. (237016) Regd. February 8, 1929. 13, High Cross, Truro, Cornwall. To carry on the bus. indicated by the title. Nom. Cap.: £2,000.

KENTS, LIMITED. (237021) Regd. February 8, 1929. To carry on the bus. of tripe dressers, bone boilers, and fat refiners, etc. Nom. Cap.: £6,000.

PAGODA, LIMITED. (237087) Regd. February 11, 1929. 23, St. Swithin's Lane, E.C.4. To adopt and maintain the brand "Pagoda" to be applied to every kind of hard and soft fruits, sugar, oils, wines, etc. Nom. Cap.: £100.

SMITH'S POTATO CRISPS (1929), LIMITED. (237096) Regd. February 11, 1929. To take over the bus. and all or any of the assets and liabilities of Smith's Potato Crisps, Ltd. Nom. Cap.: £325,000.

B. M. CHEMICAL PRODUCTS, LIMITED. (237100) Regd. February 12, 1929. 7, Victoria Street, S.W. 1. To carry on the bus. of mnfg. chemists, etc. Nom. Cap.: £1,000.

BELLINGHAM WINE, LIMITED. (236802) Regd. January 31, 1929. Bank Chambers (Room 419), 329, High Holborn, W.C. To acquire a grant conferring on the co. a sole worldwide licence to the exclusion of all other persons for the mnfr. or sale of British-made wines according to a formula, etc. Nom. Cap.: £20,300.

ARMFIELD AND SMITH, LIMITED. (236812) Regd. January 31, 1929. To carry on the bus. of mchts., salesmen, and factors in connection with and contractors for the supply of eggs, etc. Nom. Cap.: £200.

J. R. STEWART AND CO., LIMITED. (236819) Regd. January 31, 1929. 5, Clock Parade, London Road, Enfield. To carry on bus. as chemists and druggists, etc. Nom. Cap.: £1,000.

BLAYNEY AND CO., LIMITED. (236927) Regd. February 5, 1929. To carry on the bus. of wine and spirit mchts., licensed victuallers, etc. Nom. Cap.: £12,000.

HARTSHEAD COLLIERY COMPANY, LIMITED. (236932) Regd. February 5, 1929. To carry on the bus. of colliery proprs., etc. Nom. Cap.: £1,500.

DIRECT PRODUCE (LONDON), LIMITED. (236941) Regd. February 5, 1929. To enter into an agmt. with the World's Gardens (Parent Company), Ltd., and to carry on the bus. of proprs. of multiple shops, and in connection therewith to carry on the bus. of dlrs. in fruit and all kinds of farm and garden produce; dlrs. in all kinds of provisions and stores, etc. Nom. Cap.: £175,000.

W. TURNER (GRIMSBY), LIMITED. (236961) Regd. February 6, 1929. To take over the bus. of wholesale and retail fish mchts. cd. on at Grimsby and elsewhere as "William Turner, Junior." Nom. Cap.: £1,000.

CITY CREAM ICE CO., LIMITED. (237246) Regd. February 18, 1929. 34, Coleridge Street, Liverpool. To carry on the bus. indicated by the title. Nom. Cap.: £2,500.

G. PARMIGIANI FIGLIO, LIMITED. (237258) Regd. February 18, 1929. 42, Old Compton Street, W. 1. To carry on the bus. of genl. provn. mchts., fruiterers, and greengrocers, etc. Nom. Cap: £6,000.

J. W. JUKES, LIMITED. (237261) Regd. February 18, 1929. To carry on the bus. of grocers and provision mchts., etc. Nom. Cap.: £200.

THOMPSON'S STORES, LTD. (237106) Regd. February 12, 1929. 115, St. Sepulchre Gate, Doncaster. To take over the bus. of a grocer and provision mcht. cd. on at St. Sepulchre Gate, St. James's Street, and Chequer Road, all in Doncaster, by W. W. Thompson. Nom. Cap.: £4,000.

DOMINION DO-NUTS, LIMITED. (237118). Regd. February 13, 1929. To carry on the bus. of mnfrs. of and dlrs. in bakery products, etc. Nom. Cap.: £10,000.

NATIONAL CONFECTIONERY INDUSTRY, LIMITED. (237144) Regd. February 14, 1929. Kent House, 87, Regent Street, W. 1. To carry on the bus. of teachers by correspondence or otherwise of all branches of the confectionery industry, etc. Nom. Cap.: £2,000.

DOWLING'S CHOCOLATES (SUSSEX) LIMITED. (237153) Regd. February 14, 1929. To carry on bus. as indicated by the title. Nom Cap.: £500.

MODERN STORES, LIMITED. (237161) Regd. February 14, 1929. To carry on the bus. of grocers and purveyors of delicatessen formerly cd. on at 48, Archer Street, Kensington, by A. B. Julian. Nom. Cap.: £400.

PEERLESS CAKES, LIMITED. (237194) Regd. February 15, 1929. 24, George Street, Redditch. To take over the bus. of a mnfr., producer, and wholesaler of cakes cd. on at 74, Evesham Street, Redditch, Worcs., by W. F. Tayler. Nom. Cap: £2,000.

CAVENDISH TRADING COMPANY (CHEMICALS), LIMITED. (237245) Regd. February 18, 1929. 16, South Castle Street, Liverpool. To carry on the bus. of chemists, druggists, drysalters, etc. Nom. Cap.: £1,000.

Current Literature

(*Continued from next page.*)

287. Towards the Elimination of Crystallisers. Salinas. (*Ibid.*, 184-185.)

288. The Manufacture of Ice-Cream. Baxter. (*Ice and Cold Stor.*, 373, 93-94.)

Analysis

289. Potentiometric Determination of (reducing) Sugar. Tryller. (*Z. Spiritusind.*, 1929, 52, 27-28.)

290. Use of 2·6—Dichlorphenol Indophenol as a Reduction Indicator in the Examination of Foodstuffs. Tillmanns, Hirsch, and Reinshagen. (*Z. Unters. Lebens.*, 56, 272-292.)

291. Thiocyanogen Value of Parsley Seed Oil. Steger and Van Loon. (*Ibid.*, 365-367.)

292. Examination of Lard in Ultra-Violet Weiss. (*Ibid.*, 341-355.)

293. Determination of Water and Fats in Minerals rich in Fats. Prianischikov and Telnov. (*Z. Anal. Chem.*, 1929, 76, 161-166.)

294. Reactions of Soya Bean Oil. Richard. (*Ann. Falsif.*, 21, 579-582.)

295. Coffee Berry Oil. von Noël. (*Pharm. Zeutr.*, 70, 69-77.)

Current Literature

Fruit and Vegetable Products

239. Some Factors in Packing of Fruits in Wine Syrup. Barnby and Voigt. (*Glass Container*, 8, 4, 10-11.)

240. Patents Pertaining to Vinegar Manufacture. Pt. I. Bitting. (*Fruit Prods. Jour.*, 8, 7, 25-27.)

241. Malt Vinegar Manufacture. Hassack. (*Ibid.*, 29-31.)

242. Factors Influencing Smelling of Canned Prunes in Syrup due to Hydrogen. Mrak. (*Ibid.*, 17-18.)

243. Methods of Determining the Hydrogen-ion Concentration of Soils. (U.S.A. Dept. of Agric., 56 c. 3d.) Pamphlet.

244. Proximate Composition of Fresh Fruits. (*Ibid.*, 50 c. 3d.) Pamphlet.

245. Freezing Storage of Fruit and Vegetables for Retail distribution in Paraffined Paper Containers—Pt. I. Joslyn and Cruess. (*Fruit Prods. Jour.*, 8, 7, 9-12.)

246. Fruit Juice Beverages—Pt. VI. Irish. (*Ibid.*, 13-15.)

247. Simplified Sugar and Syrup Calculations for Preservers and Canners. Fellers and Mack. (*Ibid.*, 16-19.)

248. Amount of Corrosion in Cans Explained. Mrak. (*Ibid.*, 23-24.)

249. Sugar Cane Cultivation in India. Deer and Atkins. (*Planter and Sug. Man.*, 82, 12, 221-222.)

250. Report on Queensland Sugar Cane Soils. Easterby. (*Ibid.*, 222-223.)

251. Wastage in Apple Shipments. (*Ice and Cold Stor.*, 373, 86.)

252. The Vitamin A, B, and C Content of Artificially *versus* Naturally Ripened Tomatoes. House, Nelson and Haber. (*J. Biol. Chem.*, March, 495-504.)

Cereal Products

253. Studies in Cereal Chemistry. Fairbrother. (*Ind. Chem.* 5, 50, 91-92.)

254. Co-operative Marketing of Agricultural Products. Murphy. (Longmans. Pp. 140. 3s. 6d.)

255. The Place of Wheat in the Diet. Vol. 5, No. 4 of Wheat Studies. (The Food Research Dept., Stanford Univ., California. 4s. 2d.)

256. International Year Book of Agricultural Statistics, 1927-1928. (Rome: Internat. Inst. of Agric., Villa Umberto 18. Pp. 557.)

257. Annual Review of the International Grain Trade for the Current Season. Broomhall. (Liverpool: *Corn Trade News*, Corn Exchange. Pp. 56. 5s.)

Dairy Products

258. Lactose-fermenting Yeasts in Milk. Trüper. (*Milch Forsch.*, 1928, 6, 351-402.)

259. Inoculation of Pasteurised Milk. Wolff. (*Milch Zeutr.*, 1928, 57, 357-364.)

260. Alkali Value of Cow's Milk. Nottbohm. (*Milch Forsch.*, 1927, 4, 336-351.)

261. Solubility of Copper in Milk. Soloman and Quam. (*Proc. Iowa Acad. Sci.*, 1927, 34, 216-217.)

262. Determination of Silicic Acid in Milk. Kettmann. (*Milch Forsch.*, 1927, 5, 73-106.)

263. Diffusion of Sodium Chloride in Cheese. Mrozek. (*Ibid.*, 1927, 4, 391-402.)

264. The Use of the Immersion Refractometer in Milk Analysis. Elsdon and Stubbs. (*Chem. Age*, 20, 508, 271-273.)

265. Determination of Chlorides in Milk. Rodillon. (*Ann. Falsif.*, 21, 576-578.)

266. Determination of Chlorine and Sodium in Sheep's Milk. Barthe and Dufilho. (*Ibid.*, 578-579.)

267. Rapid Methods for Determination of Bacteria in Milk. Vaude Velde. (*Natuurwetensch. Tijds.*, 11, 9-14.)

268. Essentials for the Successful Operation of a Local Creamery. (U.S.A. Dept. of Agric., 37 M. 3d.) Pamphlet.

269. Points to Consider in Establishing a Cheese Factory. (*Ibid.*, 3d.) Pamphlet.

270. The Elimination of Tuberculosis in a Dairy Herd. Marshall. (*Milk Ind.*, 9, 10, 69-70.)

271. Bottled Milk Costs. Davies. (*Ibid.*, 38-39.)

272. The Preservation of Milk. O'Mahoney. (*Ice and Cold Stor.*, 373, 82-84.)

Various

273. Returns from Sugars of Different Polarisations under the Price Differential of March 3, 1928. Walker. (*Planter and Sug. Man.*, 82, 8, 141-143.)

274. Study of Massecuite obtained using Methods of Two and Three Massecuites. Zaalberg. (*Ibid.*, 142-143.)

275. Packing of Quality Canned Tomatoes. Daughters. (*Canner*, 68, 10, 12-16.)

276. The Constitution of Sugars. Prof. W. N. Howarth. (Pp. 100. London. E. Arnold. 8s. 6d.)

277. Effect of the Drying of Fresh Beet Cossettes on the Content of Nitrogenous Compounds in the Exhaustive Cossettes. O. Spengler and Paar. (*Z. Ver. deut. Zuckerind.*, 1928, 796-800.)

278. Behaviour of Oxalic Acid in the Purification of Beet Juices. O. Spengler and Brendel. (*Ibid.*, 729-746.)

279. Formation of Molasses. Spengler, Tödt, and Shen. (*Ibid.*, 749-759.)

280. Laboratory Apparatus with Conducimetric Indication for the Study of Saturation and Filtration of Beet Juices. Netuka. (*Z. Zuckerind. Czechoslav.*, 1928, 53, 129-133.)

281. Vitaminised Margarine. (*Ind. Chem.*, 5, 50, 97-104.)

282. The Influence of Nitrogen Fertilizer on the Sucrose Content of Sugar Cane. Alexander. (*Planter and Sug. Man.*, 82, 9, 161-163.)

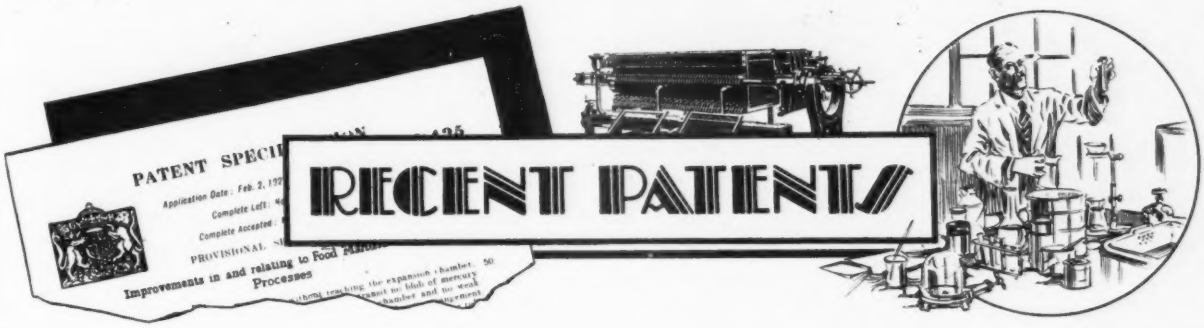
283. Moisture Control. Wesly. (*Confect. Jour.*, 1929, March, 6, 65-67.)

284. Cod Liver Oil and the Antimony Trichloride Reaction for Vitamin A. Hawk. (*Science*, February, 200.)

285. Refrigeration in the Ice-Cream Industry. Jacey. (*Ice-Cream Ind.*, 1929, March, 39-43.)

286. Cane Cultivation in Java. Koningsberger. (*Planter and Sug. Man.*, 82, 10, 181-183.)

(*Continued on previous page.*)



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office.

300,698. **Dextrose.** MARKS, E. C. R., 57, Lincoln's Inn Fields, London.—(Corn Product Refining Co., 17, Battery Place, New York, U.S.A.)

300,712. **Testing and stamping eggs.** SAMPSON, J. J., 35, Aungier Street, and CARTON, A., 17, Halston Street, both in Dublin.

300,713. **Cleaning and filling bottles, etc.** BLAXTER, A. P., AND CHALONER, G. W., Niagara Works, Eagle Wharf Road, London.

300,718. **Sterilising water.** SLATER AND CO. (ENGINEERS), LTD., J. AND ROBINSON, J. C., 50, Wells Street, Oxford Street, London.

300,727. **Bottling.** GRAHAM-ENOCK MANUFACTURING CO., LTD., AND ENOCK, A. G., Margaret Street Works, Windus Road, Stamford Hill, London.

300,753. **Labelling Bottles.** FLOWER, A. L., 64, East Street, Leeds.

300,805. **A closure for non-refillable bottles.** SMITH, J. R., Box 276, Berkeley, California, U.S.A.

300,815. **Slaughtering for food.** DOUGLAS AND SONS, LTD., W., Douglas Wharf, Putney, London.—(Schermer, K., 44, Winterstrasse, Karlsruhe, Baden, Germany.)

300,848. **Wrapping-machines.** MATHYS, A. W., 52, Chancery Lane, London.—(Lauenstein and Co. Ges., 2, Georgiistrasse, Wernigerode-on-Harz, Germany.)

300,859. **Device for mixing liquids, beating eggs, and like purposes.** ORR, W. G., Thornbury, Whyteleafe, Surrey.

300,869. **Coffee percolators.** LAMPLOTA, H., 6, Ceská, Ul., Brno, Czecho-Slovakia.

300,876. **Paper bags.** WHITE, A. E., 88, Chancery Lane, London.—(Bates Valve Bag Corporation, 8200, South Chicago Avenue, Chicago, U.S.A.).

301,121. **Weighing-apparatus.** PARNALL, T. ST. J. B., Grand Atlantic Hotel, Weston-super-Mare.

301,304. **Sugar syrups.** LAFEUILLE, F., 35, Rue Brunel, Paris.

Syrups are boiled in sugar factories by drawing the whole quantity of syrup, from which a strike is to be made, into a cylindro-conical or prismatic boiling and crystallising rotating apparatus provided with a jacket or a system of tubes for circulating heating or cooling means, vacuum and syrup intakes, and an emptying door. The syrup is concentrated to a suitable degree Brix and caused to grain by applying a higher vacuum—*e.g.*, by shutting off the steam or circulating water—the building up of the crystals, as well as the exhaustion of the mother liquor, being attained by gradual concentration accompanied with stirring of the total quantity of syrup, and finally cooling down in said rotating apparatus. The finished massecuite, prior to the final cooling, may have added to it green molasses of a first strike, then boiled further and cooled down.

301,381. **Moulding dough.** SOC. ANON. DES ATELIERS SPILTOIR, Rappez, Hecq, Haine St. Paul, Belgium.

301,800. **Meat paste, cooking fowls.** DYER, R. W., Helena Street, Newfield, New Jersey, U.S.A.

A meat paste is made by cooking domestic fowls with a small quantity of water in a steam-jacketed closed kettle and raising the temperature to about 260° F. for 2 to 3 hours, or to a slower temperature for a longer period. The gelatinous material is thus dissolved from the bones, and the resultant mass, consisting of cooked flesh, marrow, and softened bones, is ground and mixed up. The cooking is carried out under conditions which will keep the birds saturated with the meat juices

302,043. **Bottling.** SEMARK, F. W. (trading as BREWERS' EQUIPMENT CO.), 21, Bishop Street, and ALLEN, J. H., 48, Willows Crescent, both in Birmingham.

302,439. **Milk food preparations.** GOLDING, J., Shinfield, Berkshire, and DECCO, LTD., 4, Throgmorton Avenue, London.

A dried milk food product is formed by feeding milk and whey separately but simultaneously on to a heated drying or evaporating surface of the drying-roll type in such a manner that the products become mixed thereon. Preferably about equal proportions of whey and of separated and/or whole milk are used, and, by feeding the whey into the preheater and over the evaporating sheets on to the heated rolls and feeding the milk directly on to the rolls, the process is conveniently carried out with the apparatus set out in Specification 248,131. The product is easily friable and can be readily ground to powder.

By provision of taps, etc., to regulate the flow of milk and/or whey, the nature of the product may be varied as required. Acidity of the whey may be neutralised by the addition of ammonium hydrate, etc. The whey coming from cheese, casein, etc. manufactures may be used and may be subjected to preliminary treatment such as centrifugal separation, heating or cooling, or pasteurisation. The milk may be subjected to similar preliminary treatment.

302,743. **Sterilising milk, etc.** SELIGMAN, R., Point Pleasant, Wandsworth, London.

302,806. **Confectionery.** FERGUSON, P. T., 52, Queensberry Square, Dumfries.

302,883. **Ice-creams and like preparations.** HOMFREEZE CORPORATION, 100, East 42nd Street, New York, U.S.A.

302,896. **Dispensing Beverages.** RICHARDSON CORPORATION, 1069, Lyell Avenue, Rochester, New York, U.S.A.

302,734. **Extracting pectin.** PECTINERIE DU KERVOR, Colmar, Haut-Rhin, France.

Materials such as apples or apple pulp, from which pectin is to be extracted, are subjected to a preliminary treatment comprising washing them with dilute acid, to remove materials such as iron which are injurious to the pectin. The washing water containing acid, preferably inorganic acid, may be heated almost to boiling point to augment the removal of deleterious substances. The material so treated is subjected to any usual extraction process, such as boiling with water containing tartaric or other organic acid to extract the pectin.

303,059. **Preserving fatty materials.** DEURS, J. A. S. VAN, 21, Thorvaldsensvej, Frederiksberg, near Copenhagen.

The fatty content of animal and vegetable substances is preserved by surrounding the fat with material having a pH value of less than 5—*e.g.*, by adding an agent which can in aqueous solution augment the hydrogen ion concentration by piberation of hydrogen ions or by hydrolysis, or by adding acid producing micro-organisms. The substances which may be treated include cod and other fish livers, fish such as herrings, fruits such as palm fruits, and copra and like seeds.

303,413. **Extracting fats.** DEURS, J. A. S. VAN, 21, Thorvaldsensvej, Frederiksberg, near Copenhagen.

In extracting fats or oils from fish liver, copra, olives, or from mixtures of fats or oils and other substances such as mineral oil and fuller's earth, fat and hydrogenating catalyst, etc., the substances are treated to increase the hydrogen ion concentration, whereby the fat or oil tends to form a continuous phase. The separation of the fat is assisted by heat agitation; concentration may be increased to give a pH value below 5 by addition of acid or of acid forming bacteria.

302,447. **Preserving food, etc.** JOHNSON, J. Y., 47, Lincoln's Inn Fields, London.

Perishable goods, such as eggs, fruit, etc., are preserved by treating with an aqueous solution of a condensation product of urea and formaldehyde and then drying, a thin impervious coating being obtained from diamethylolurea—*e.g.*, by boiling its aqueous solution with or without the addition of condensing agents may be used. Small amounts of organic water soluble solvents, such as ethyl alcohol, glycol, glycerine, and other aliphatic alcohols, may be added. A small amount of free formaldehyde is also usually present and acts as a preservative. The solution contains generally 10 to 30 per cent. of the condensation product. Reference is made to the Public Health (Preservatives, etc., in Food) Regulations, 1925.

297,338. **Sugar.** MAUTNER, H., Novak Pusta, Hungary.

Sugar preparations; confectionery.—A process for the preservation of sugar consists in permanently incorporating ethyl alcohol in the sugar mass, a dry, solid product being obtained containing chemically unchanged ethyl alcohol in such amount that the crystals do not become wet. Ordinary crystallised starch sugar may be re-crystallised from alcohol, or a normal starch sugar solution may be thickened and mixed with ethyl alcohol, seed crystals of the same origin being added and the mass stirred and left to solidify. The process is applicable to crystallised invert sugar, levulose, maltose, and also to sugar solutions mixed with flavouring materials. Volatilisation of the alcohol is prevented by coatings of chocolate, icing sugar, fondant paste, tragacanth or gelatine, or by moulding under pressure so that the surface of the sugar melts and forms a non-porous coating.

297,457. **Butter, etc.** GFELLER, E., 55, Aegertenstrasse, Berne, Switzerland.

In order to improve their keeping properties, butter and margarine are heated to destroy the bacteria. This treatment melts the fat, but separation of the watery constituents is prevented by energetic mixing, stirring, or whirling, which is continued until the fat has again solidified.

297,482. **Sugar manufacture.** GASPAR Y ARNAL, T., 18, Calle de la Princesa, Madrid.

Purifying saccharine liquids.—Sugar solutions, such as molasses, are treated with sufficient quantities of soluble ferrocyanides to precipitate alkali or alkaline earth salts, including magnesium in the form of double ferrocyanides of calcium and potassium. Thus, if it is desired to remove potassium chloride, calcium ferrocyanide, or a mixture of sodium ferrocyanide and calcium chloride may be added. To remove calcium chloride, sodium ferrocyanide and potassium chloride may be added. The precipitation may be effected in the presence of an alcohol or similar organic liquid. The double ferrocyanide obtained is treated with an iron or copper salt and a little acid to produce Prussian blue and calcium and potassium salts.

Printed copies of the full Published Specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.